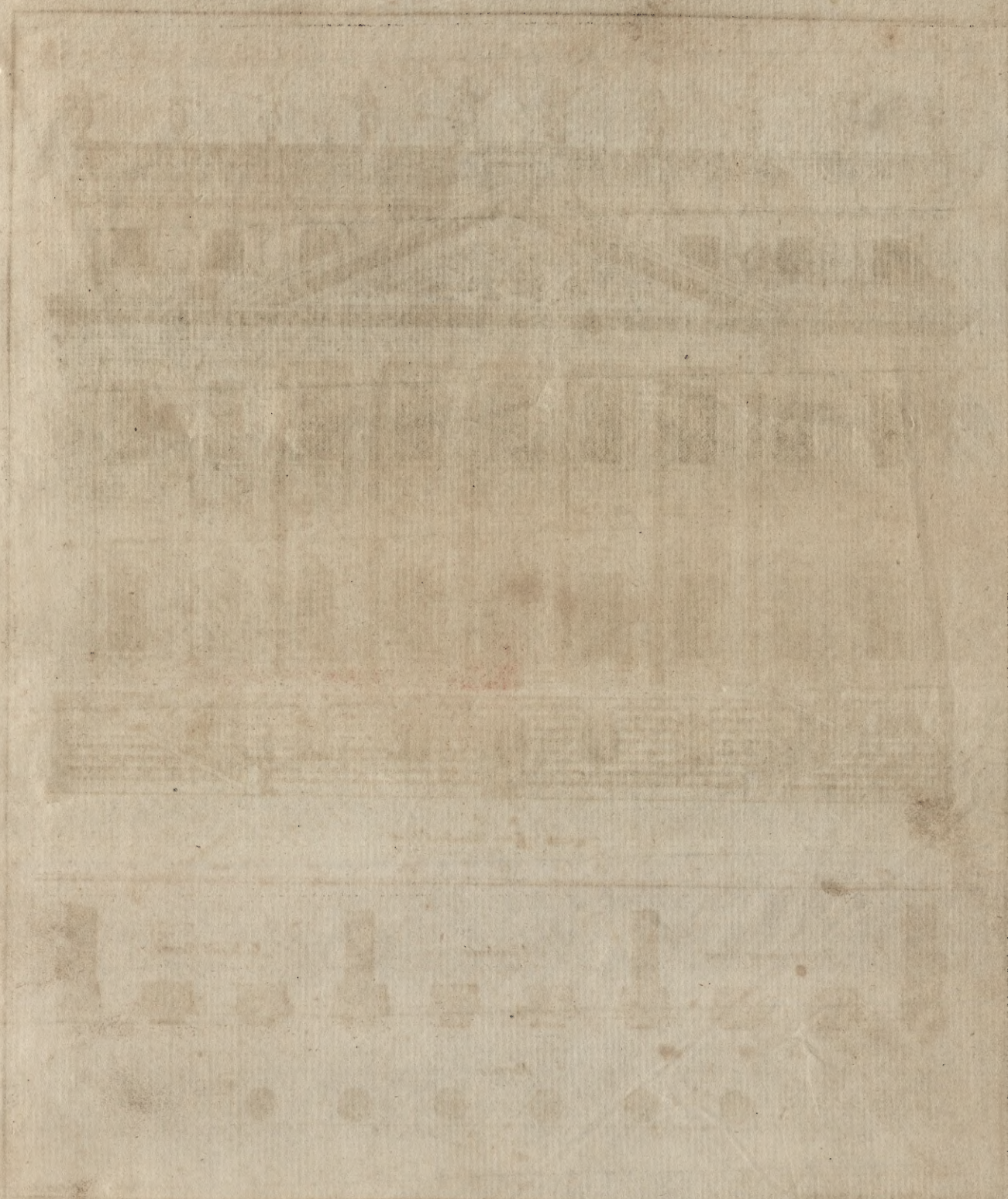


James T. O'Connell

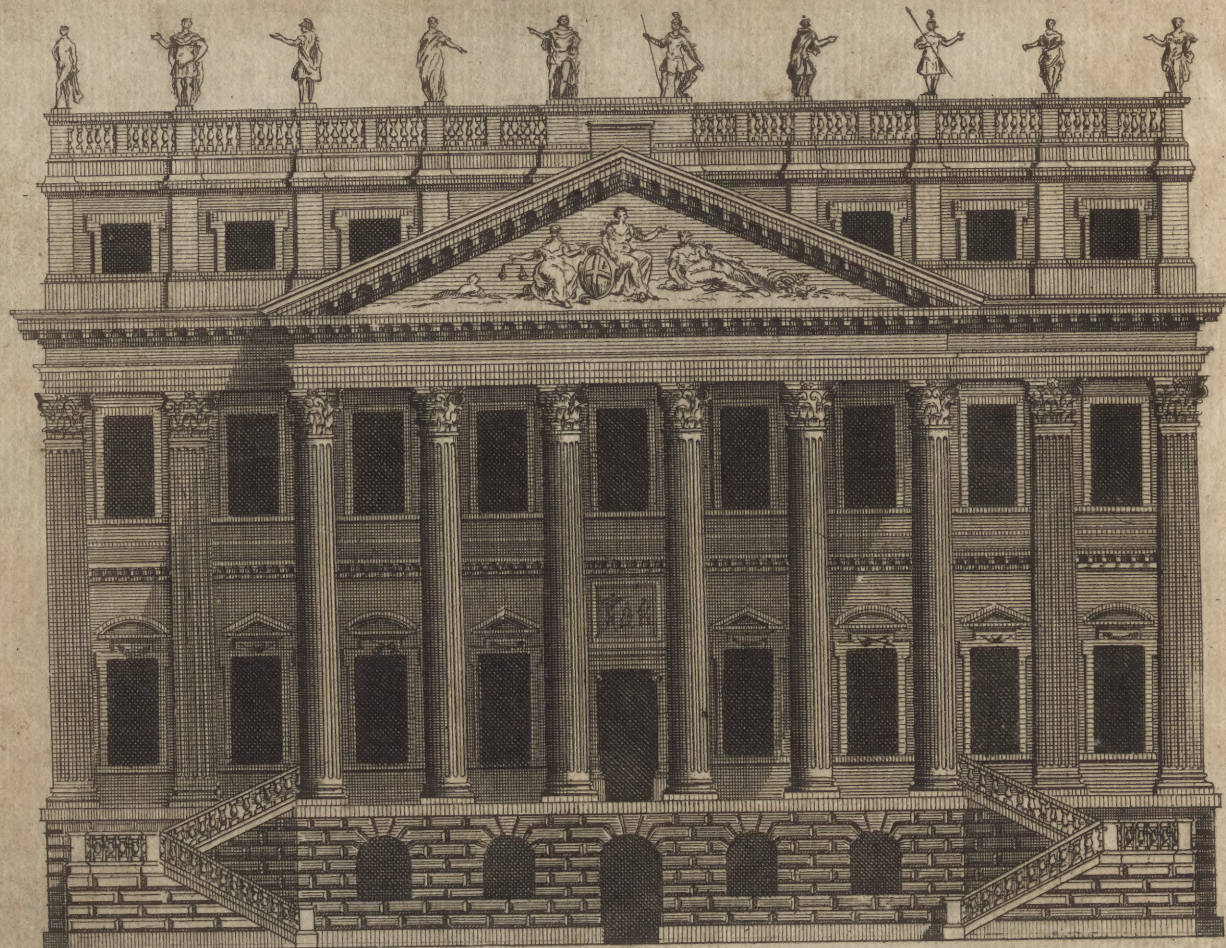
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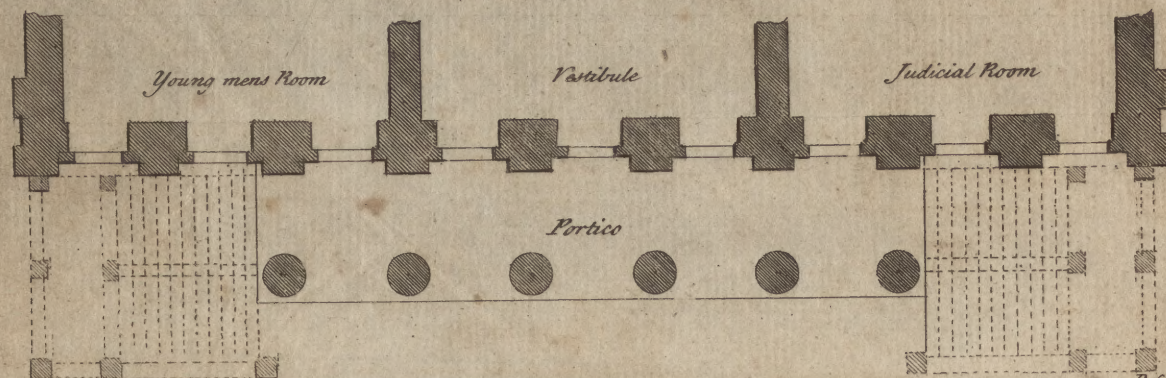
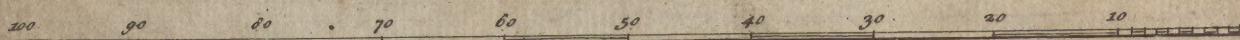
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THE
P R E F A C E.

INCE the Study of the several Sciences relating to Building, has, of late Years, been so universally encouraged and practised by Persons of the highest Rank and Distinction, it would be needless, if not impertinent, to say any thing to recommend it : And, since there have been so many able and elaborate Dissertations, in order to demonstrate the Usefulness of each individual Branch of it, there may be some Persons, perhaps, ready, at first View, to censure our present Undertaking as unnecessary, and of very little, if any, Importance. Such partial and prejudiced Judges, however, will (we doubt not) upon mature Deliberation, find, that no Treatise was ever better form'd, or better calculated for the Service of the Publick ; they will be obliged to acknowledge, that the Rules and Methods for the Attainment of the Art above-
B mentioned,

P R E F A C E.

mentioned, are not to be met with in any one single Volume, how large soever, which has been hitherto written on the Subject, and that the young Practitioners must, of Necessity, have Recourse to a Variety of Books, and put themselves to a large Expence, before they can be able to form a just Idea of so useful an Art in all its various Branches. In order, therefore, to bring the Substance of the Whole into a moderate Compass, and thereby save them abundance of Time, and ease them of so great a Charge by the Sale thereof at a reasonable Price, I have ventured to offer to the Publick this New Magazine, which, I flatter myself, upon a fair and impartial Examination, will be allowed to contain, not only all the Geometrical Problems that are most useful and requisite to be known, but the most easy, expeditious, and correct Methods for drawing the Five Orders of ARCHITECTURE, with all such particular Embellishments of Doors, Windows, &c. as best strike the Eye, and are most agreeable to each respective Order: The newest, and most approved, Designs for erecting Truss Roofs, with the utmost Strength and Beauty; and the most commodious Manner of forming a Variety of Stair-Cases, with their twisted Rails, &c. All which, together with the different Kinds of Ceiling-Pieces, Shields, Compartments, and other curious and uncommon Decorations, herein particularly described, will, I hope, give universal Satisfaction, and prove, upon the Perusal, to be the most copious and compleat, as well as the cheapest, Performance of the like Nature hitherto extant.



A D I S-



A
DISSERTATION
 ON
Practical Geometry.



RULES for the Description of Polygons, &c.

PROBLEM I.

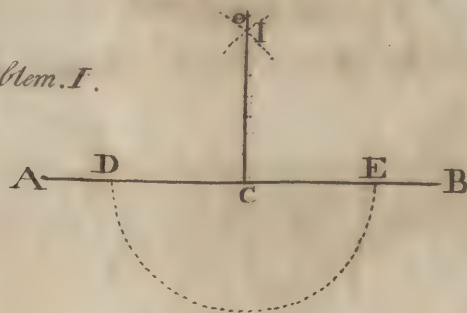
For the Erection of a Perpendicular on the Middle of a Right Line given.



UPPOSE C to be the Point proposed in the Middle of the Line A B.

Describe, as you think proper, on the given Point C, the Semicircle D E; make the Section I on the two Points D and E, from the Point C; then draw C O, being the Line demanded, thro' the Section I, and that Line C O will be perpendicular to A B, the Line given, and be erected upon C, the Point proposed.

Problem. I.



page III

PROBLEM

PROBLEM II.

For the Erection of a Perpendicular on the Extremity of a Line given.

Suppose ab to be the given Line, and b the End, or Point, whereon the Perpendicular is to be erected.

From the Point b , upon the Line ab , five equal Divisions must be made towards a upon b ; with four of them, as bd , describe the Arc f , on the Point c ; with five Divisions, as be , describe the Arc g ; from the Point b , thro' the Intersection fg , draw the Line bb ; which will be perpendicular to the Line ab upon the Point b .

PROBLEM III.

Another Method of erecting a Perpendicular on the Extremity of a Line given.

Suppose ab to be the Line given, and a to be the Point proposed.

On the Point a describe the Arc cf with ac , the Radius; from the Point c towards f , upon the Arc cf , make the Points d and e ; upon those last Points describe the Arcs g and h ; from the Point a , thro' the Intersection gh , draw the Line ai , and that Line ai is the Perpendicular proposed.

PROBLEM IV.

How to let a Perpendicular fall on a Line given, from a Point without the Line.

Suppose C to be the Point from whence a Line is to fall perpendicular to AB .

Describe,

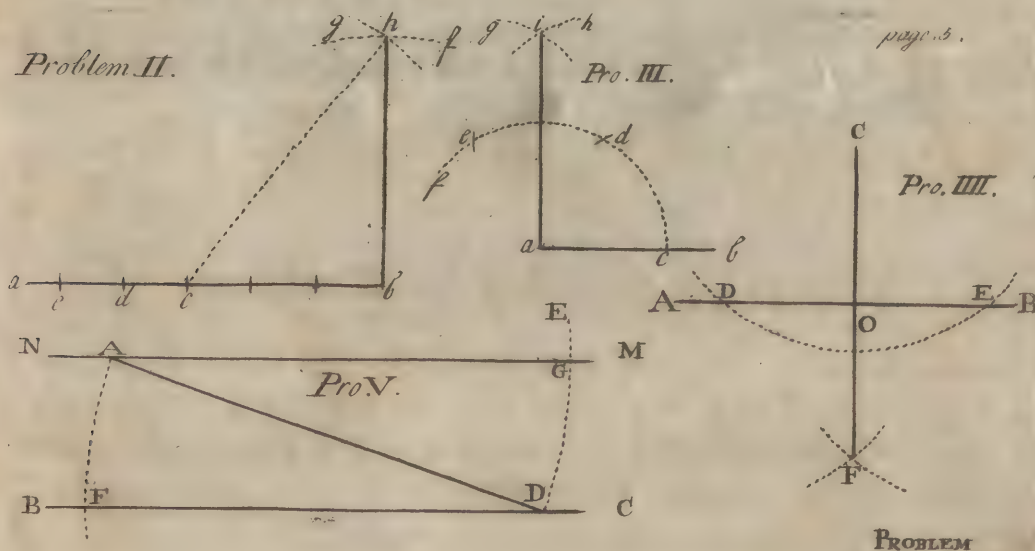
Describe, as you think proper, on the given Point C, the Arch D E, intersecting the Line A B in the Points D and E ; make the Section F on the Points D and E ; draw the Line C F, and the Line C O will be the Line demanded.

PROBLEM V.

How to draw a Parallel Line thro' a Point given, to a Line given.

Suppose A to be the Point given, thro' which a Parallel Line to that of B C is to be drawn.

Draw, as you think proper, upon the Point A, the Oblique Line A D ; describe the Arc D E ; upon the Point D describe the Arc A F ; make the Arch D G equal to the Arch A F ; draw the Line M N thro' the Points A G, and that is the Line demanded.



PROBLEM VI.

For the Division of a Right Line given, into what Number of equal Parts you think proper.

Suppose A B to be the Line which you propose to divide into fix equal Parts.

From the Point A draw, as you think proper, the Line A C thro' the extream Point B; draw the Line B D parallel to the Line A C from the Points A and B, and along the Lines A C and B D; let any fix equal Parts, viz. *efg b i k*, be carried along the Line A C, *r q p o n m* along the Line B D; draw the Lines *en*, *fo*, *gp*, *bq*, *ir*, then the Line A B will be divided into fix equal Parts at the Sections S T V X Y.

PROBLEM VII.

How to draw a Spiral Line round a Line given.

Suppose I L to be the Spiral Line round which such Spiral Line is to be drawn.

Divide half the Line I L into as many equal Parts as you propose to make Revolutions.

EXAMPLE *for the making four Revolutions.*

Divide the Half B I into four equal Parts B C, E, O, I; divide likewise B C into two equal Parts in A; upon the Point A describe the Semicircles B C, D E, F G, H I; upon the Point B describe the Semicircles C D, E F, G H, I L, and you will have the Spiral Line demanded.

PROBLEM

PROBLEM VIII.

For making an Equilateral Triangle on a Line given.

Suppose AB to be the Line given, whereon the Triangles are to be made.

On the extreme Points A, with AB the Radius, describe the Arc BD; on the extreme Point B, with BA the Radius, describe the Arc AE; from the Intersection C draw the Line CA, CB; and ABC will be the Triangle demanded.

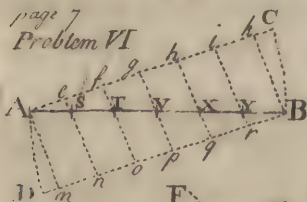
PROBLEM IX.

For making of a Triangle, the Sides whereof are equal to Three given Lines.

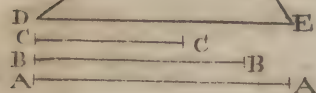
Suppose ABC to be three given Lines.

Draw the Line DE equal to the Line AA; on the Point D, with BB the Radius, describe the Arc GF; on the Point E, with CC the Radius, describe the Arc HI; from the Intersection O draw the Line OE, OD, the Triangle DEO, will consist of three Sides, equal to those given AA, BB, CC.

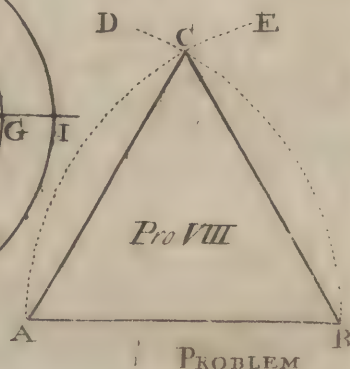
page 7
Problem VI



Pro. IX.



Pro. VII.



Pro VIII

PROBLEM

PROBLEM X.

For making a Square on a Right Line given.

Suppose A B to be the given Lines.

Let the Perpendicular A C be erected on the Point A ; describe the Arc B C on the Points B and C, with A B the Radius ; make the Section D ; from the Point D draw the Lines D C, D B ; ABCD is the Square proposed to be made.

PROBLEM XI.

For making of a Regular Pentagon on a Right Line given.

Suppose A B to be the given Line.

On the extreme Point A, and with A B the Radius, describe the Arc B D F ; erect the Perpendicular A C ; divide the Arc into five equal Parts I D L M B ; draw the Line A D ; divide A B the Base, into two equal Parts in O ; erect the Perpendicular O E, on the Intersection E ; with E A the Radius, describe the Circle A B H G F ; carry the Line A B five times round, in the Circumference of the Circle, and a regular equiangular equilateral Pentagon will be made.

PROBLEM XII.

For making a regular Hexagon on a right Line given.

Suppose A B to be the given Line.

On the extreme Points A and B, and with A B the Radius, describe the Arcs A C, B C ; on the Section C describe the
Circle

PRACTICAL GEOMETRY.

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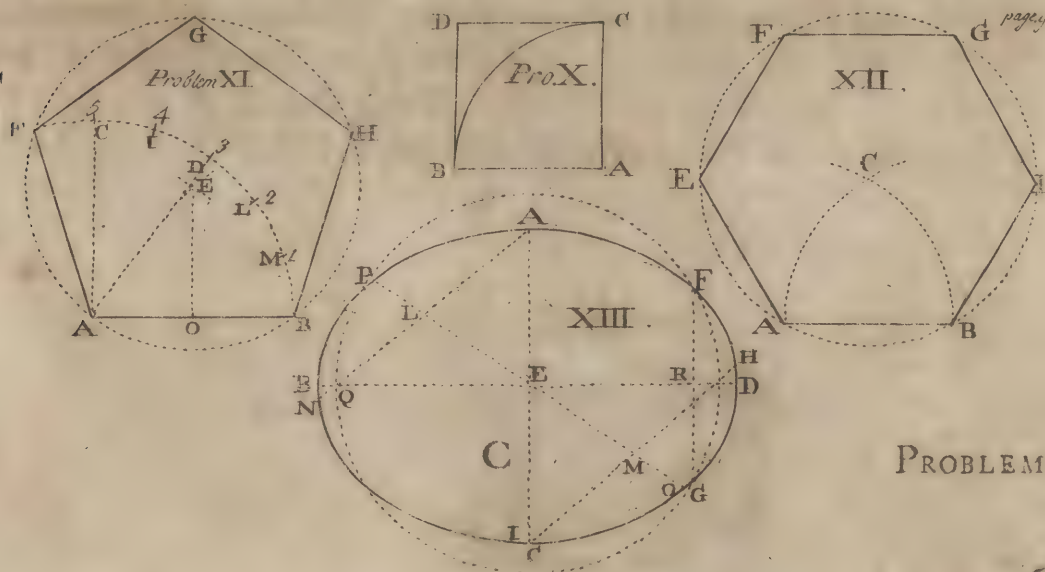
Circle ABDGFE; carry AB, the Line given, six times round in the Circumference, and you will have, on the given Line AB, a regular Hexagon ABDGFE.

PROBLEM XIII.

For finding the Center, and the two Diameters, of an Oval.

Suppose ABCD to be the Oval, the Center and Diameters whereof are proposed to be found.

In ABCD, being the Oval proposed, draw, as you think proper, the two parallel Lines AN, HI; which halve in the Points L and M; draw the Line PLMO, which halve in E, and the Point E will be the Center. On the Point E describe, as you think proper, the Circle FGQ, cutting the Oval in F and G; thro' the Intersections F and G, draw the right Line FG; which also halve in R; draw the largest Diameter BD through the Points E R; thro' the Center E draw the smallest Diameter AEC, parallel to the Line FG, and the Thing proposed will be accomplished.



PROBLEM

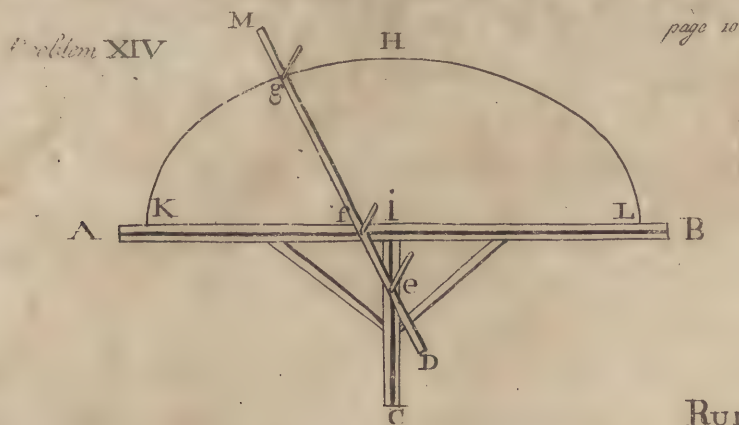
PROBLEM XIV.

For the Description of an Eliptic Arch by the Tramel, when the Length and Height thereof is given.

Suppose $ABCi$ to represent the Tramel, the Leg Ci being at right Angles with AB the Head, there is a Groove in each of them (as represented in the Middle of each of them by the strong black Lines) for the Pins e and f , which are fastened to the Rule DM , of a greater Length than iK ; the Pins e and f , must be fixed at such a Distance, as that, when a Pencil, &c. is put thro' a Hole at g , the Length eg is equal to iK , the Half of the Base Line of the Arch, and the Length fg equal to iH , the Height which the Arch is proposed to rise.

OPERATION.

Fix the Head of the Tramel AB , on the Length of the Arch KL ; fix likewise the Point of the Pencil g , at the Point K , and the Pins f and e in the Grooves AB and iC ; with one Hand move the Pencil g , and with the other, direct the Pins f and e in their several Grooves, till the Pencil g comes to L , which will describe the Arch demanded KHL .



RULES

RULES *for the Description of Arches, Oval, &c.
by the Intersection of Right Lines.*

PROBLEM XV.

For the Description of a Gothic Arch reverse by Intersection, &c.

SUPPOSE ab to be the Base of the Arch proposed, and ed the Height demanded.

Draw the Line ec perpendicular to the Line ab , from the midst e , double to the Height proposed ed ; from the extreme Points a and b , draw the Lines ac and bc ; divide each of the Lines ac and bc into any Number of equal Parts, as you think proper (the greater however the Number is, the more exact the Work will be) suppose 18; if then strait Lines be drawn from the Points of Division 1, 2, 3, 4, &c. of the Line ac , to the correspondent Points of Division 1, 2, 3, 4, &c. of the Line cb , the Points of Intersection will be in the Arch demanded.

page. 11.

Problem. XV.



PROBLEM

PROBLEM XVI.

For the Description of the Segment of a Circle by Intersection, &c.

Operate as in the Gothic Arch reversed, and the Segment will be accomplished.

To find the various Compressure, or Thrust of Arches, according as they are in Height; by Virtue whereof, the Thickness of Walls, or Piers, are able to bear up the subtending Arch.

Divide the Segment adb into three equal Parts, as af , fg , and gb ; continue the occult Line gb to h , so that bh be equal to bg ; upon the Point b let the Perpendicular bk fall, which is the Inside of the Wall required; thro' the Point b draw the Line il parallel to bk , and bi is the Thickness of the Wall or Pier required. Proceed likewise in the same Manner for any other Arch proposed.

PROBLEM XVII.

For the Description of an Eliptic Arch to any Width or Height proposed.

Suppose ab to be the Width, upon the extreme Points a and b erect the Perpendiculars ac and bd , equal to the Height required; draw the Line cd parallel to ab ; divide the Line cd in half at e ; divide ac and bd , ce and ed , each of them into the same Number of equal Parts, and draw the intersecting Lines which are correspondent, according to the XVth Problem, and the Arch aeb will be completed.

PROBLEM

PROBLEM XVIII.

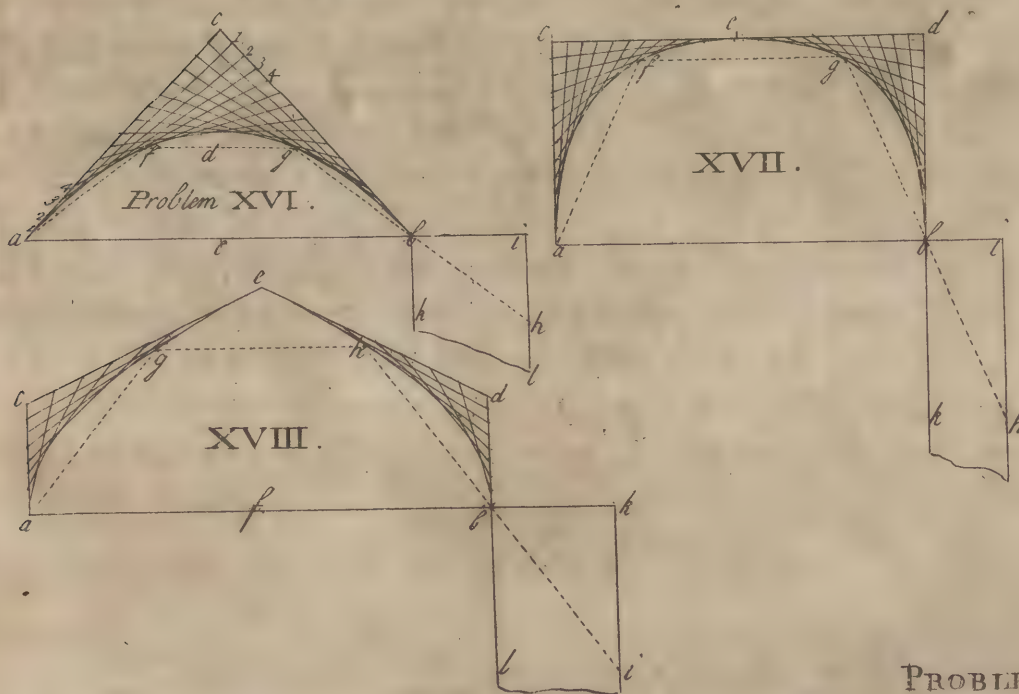
For the Description of the Gothick Arch by Intersection, &c.

Suppose ab to be the Width, and fe the Height proposed.

Upon the extreme Points a and b , raise the Perpendicular ac and bd , each equal to half the Height proposed fe ; draw the Lines ec and ed ; divide ac and bd , ec and ed , each into the same Number of equal Parts, and draw the intersecting Lines which are correspondent, according to the Direction before given, and the Arch $ae b$ will be completed.

N. B. Suppose the Arch should be required to be quicker or flatter on the Hanse, you have nothing more to do but to lengthen or shorten the perpendicular Lines ac and bd .

page 13



PROBLEM

PROBLEM XIX.

For the Description of the Gothic Arch Rampant.

Draw the occult Line ag , the horizontal Width of the Arch required; on the Middle of f erect the Perpendicular fe ; upon the two Points a and g erect the Perpendiculars ac and gd ; make gb equal to the Height of the Ramp, and draw the Line ab ; let be be equal to the Height of the Arch required, and as and bd each of them equal to the Half of be ; draw the Lines ce and ed ; divide ac and ce , cd and db , each of them into the same Number of equal Parts; draw the intersecting Lines, which are correspondent, according to the Directions before given, and the Arch required will be completed.

PROBLEM XX.

For the Description of the Elliptical Arch Rampant.

Draw the occult Line af ; on the Middle at g erect the Perpendicular gd ; upon the two Points a and f erect the Perpendiculars ac and fe ; let fb be equal to the Height of the Ramp, and draw the Line ab ; let the Height ac and be be equal to the Height of the Arch required; draw the Line ce ; divide the Lines ac , cd , and de , eb , each of them into the same Number of equal Parts; draw the intersecting Lines which are correspondent, according to the Directions before given, and the Arch required will be completed.

PROBLEM XXI.

Another Method for the Description of the Gothic Arch reverse.

Draw ab equal to the Base proposed, and cd parallel to ab , and equidistant to the Height of the Arch required, and equal
in

PRACTICAL GEOMETRY. 15

in Length to the Half of ab , and proceed as directed in *Problem XVII.* and the Arch required will be described.

PROBLEM XXII.

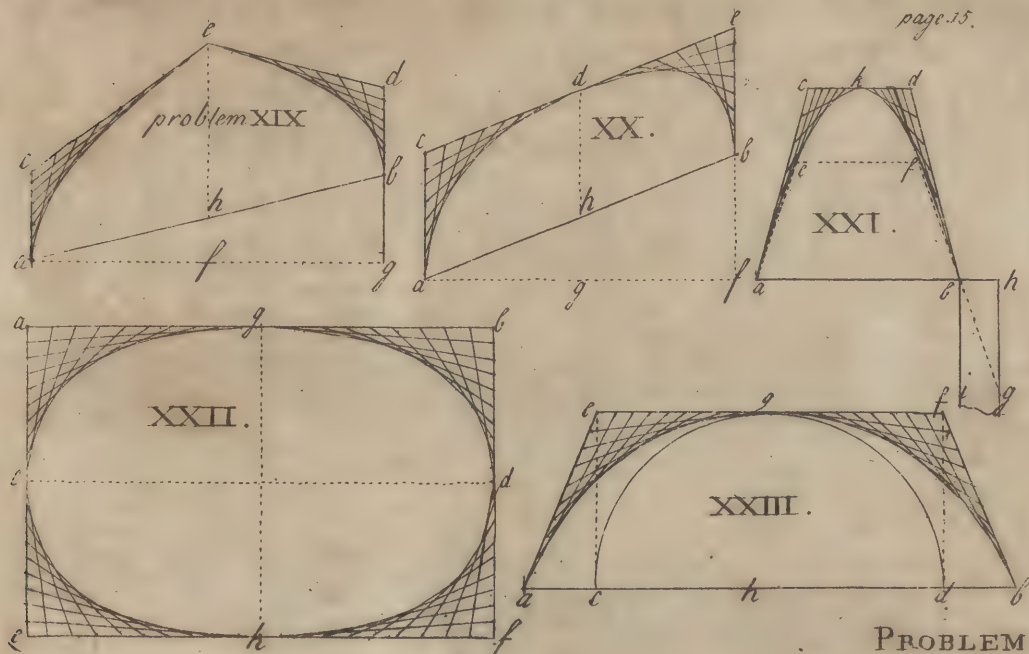
For the Description of an Oval.

The Transverse and Conjugate Diameters being given, and intersected twice in the Middle in right Angles, operate as directed in *Problem XVII.* and the Ovals required will be described.

PROBLEM XXIII.

For the Description of an Arch of equal Height to a Semicircle, but of a longer Distention.

Suppose cgd to be a Semicircle, and ab the Length required, whose Elevation of an Arch is equal to the Semicircle; draw ef parallel to ab ; let ef be equal to cd , and proceed as directed in *Problem XXI.* and the Arch required will be described.



PROBLEM XXIV.

For the Description of an Oval that is proposed to be smaller at one End than the other.

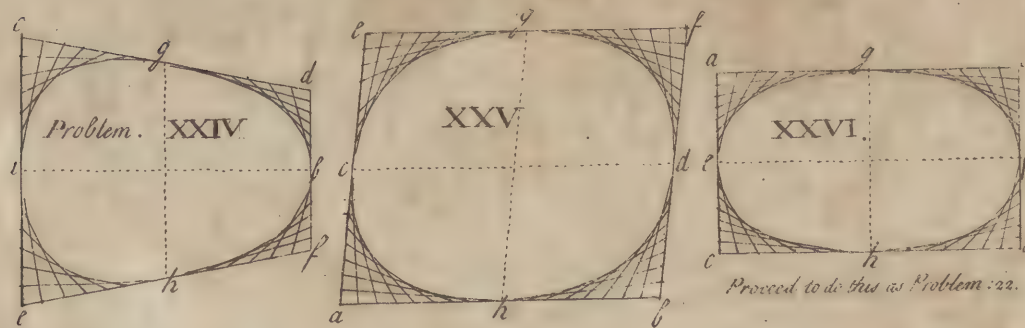
Let the Transverse and Conjugate Diameters be given, as ab and hg , and intersecting each other in the Middle, draw ec and fd parallel to hg ; let fd be equal to three-fourths of hg ; thro' the Point fb and dg draw the Lines fe and dc , and proceed as directed in *Problem XXII.* and the Oval which was required will be described.

PROBLEM XXV.

For the Description of an Oblique Oval.

Suppose ab , ae , ef and fb , to be the Sides of a Rhomboid, within which an Oval is to be inscribed.

Draw the Transverse Diameter cd parallel to ab and ef , and the Conjugate Diameter gh parallel to ae and bf , and proceed as directed in *Problem XXII.* and the Oval will be described which was required.



RULES



RULES *for the Description of Gothic Arches, generated by Segments of Circles.*

PROBLEM I.

To describe a Gothic Arch on a given Line.

SUPPOSE AB to be the Line given; on A , with the Interval AB , make a Description of the Arc Bd ; make likewise on the Point B , with the Interval BA , the Description of the Arc Ae ; and the Arch required, *viz.* ACB , will be completed by the Intersection C .



PROBLEM

PROBLEM II.

Another Way of describing a Gothic Arch.

Suppose A B to be the Line whereon the Arch is to be described.

Divide the Line A B into three equal Parts at the Points C and D ; on that of C, with the Interval B, make your Description of the Arc B f ; on that of D, with the Interval A, delineate the Arc A g ; and the Arc required, viz. A E B, will be completed by the Intersection E.

PROBLEM III.

Another Way to describe the Gothic Arch.

Suppose A B to be the Line whereon the Arch is to be described.

Let A B be divided into three equal Parts at the Points C and D ; from the Points A and B, let fall the Perpendiculars A E and B F, equal to A D and B C ; draw Lines, of what Length you please, thro' the Points F C and E D ; on the Points C and D, with the Interval A C, or D B, make your Description of the Arcs A G and B A ; on the Points E and F, with the Interval E H, or F G, make your Description of the Arcs H K and G L ; and the Arch required, viz. A, G, I, H, B, will be completed by the Intersection.

PROBLEM IV.

Another Way of describing the Gothic Arch.

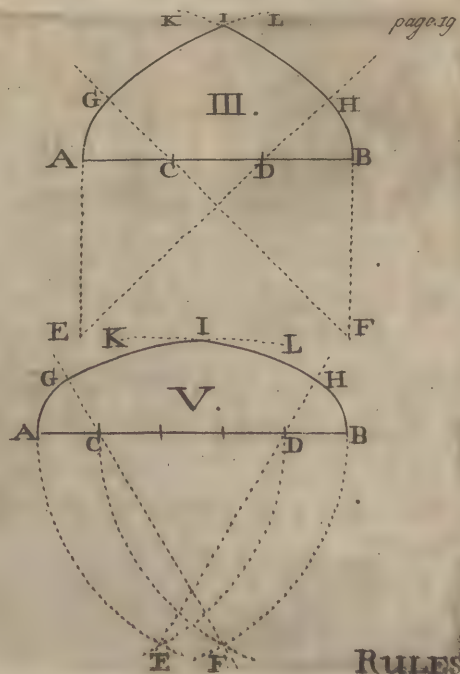
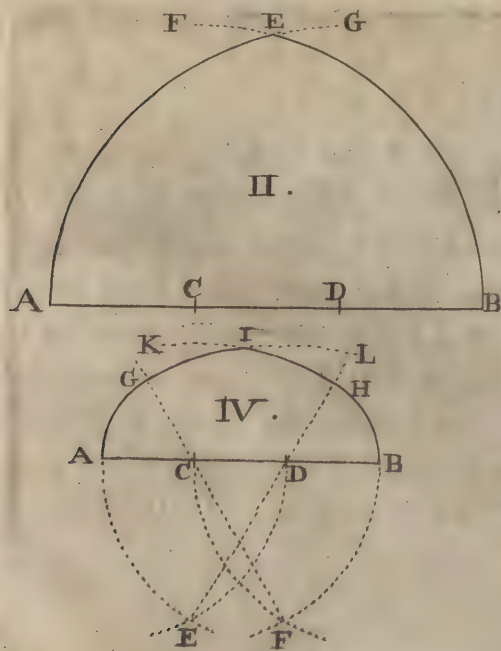
Let A B be divided into three Equal Parts at C and D ; on the Points A C D B, with the Interval A D, make four Arcs ;
and

and thro' the Intersection E, and the Point D, draw the Line EDH; thro' the Intersection F, and the Point C, draw the Line FCG; on the Points C and D, with the Interval CA, or DB, delineate the Arcs AG and BH, and on the Points E and F delineate the Arcs HK and GL; and the Arch required, viz. AGIDB, will be completed by the Intersection I.

PROBLEM V.

For the Description of a Gothic Arch another Way.

Let AB be divided into five equal Parts on the Points A, C, D, B; and the Interval AD make your Description of the four Arcs, and then proceed as above directed, and you will complete the Arch required.





RULES *for the Description of the Angle or Mitre Arch or Groins both regular and irregular; as also of a Center for a semicircular Window in a circular Wall: And how to form Niches, &c.*

PROBLEM I.

How to discover the Angle, or Mitre Bracket, of a Cove.

DR A W the Base A B; on A draw A D at right Angles; and equal to A B draw the Line D B; let the Line D A be continued to C; make A C equal to A B; on the Point A, with the Interval B, delineate the Arc B C; on the Points B D draw B E and D F; at right Angles with the Line B D, and equal to A D or A C, draw the Line F E. Let A B be divided into any Number of equal Parts, the more the better, and more exact the Operation, and thro' those Divisions draw Lines parallel to A C; on the Arc B C, carry them on to the Line B D; from the Divisions on D B draw Lines parallel to D F and B E; let the Perpendiculars on D B be equal to those on A B, closing in the Arc B C; describe the Arc F B by a bended Rule, &c. thro' the Points on the Perpendiculars from B D, and the Mitre required will be completed.

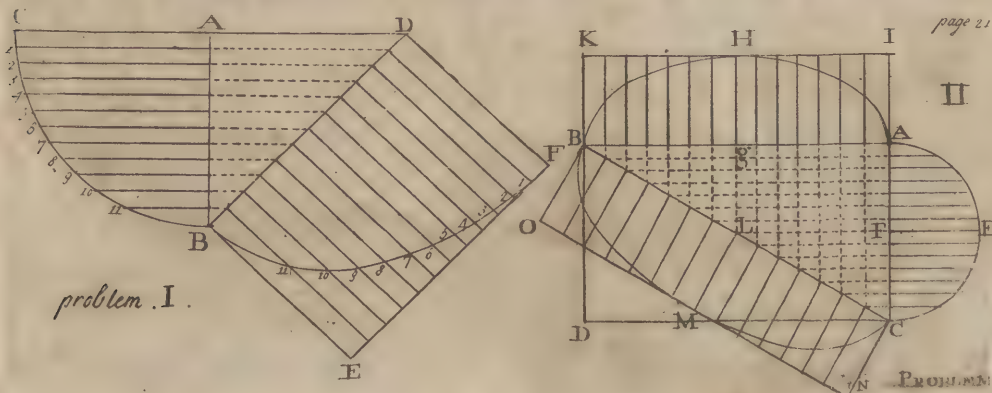
PROBLEM

PROBLEM II.

In case the lesser Arch of a Groin, which is irregular, be a Semicircle given, the Formation of a larger one, which is not a Semicircle, is required after such a manner as that the Intersection of the two Arches shall make the Groins from the Angle hang perpendicular over the Base thereof.

Suppose ABCD to be the springing Walls whereon the Arches are to be erected, and AEC the semicircular Arch given.

Draw the Line BC; let the Line AC be continued to I, and BD to K; on B and C erect the Perpendiculars BO and CN, make BK, AI, CN, and BO, each of them equal to the Height of the Semicircle given, as FE; draw the Lines KI and NO; let AC be divided into as many equal Parts as you think proper; thro' the Divisions on AC draw Lines parallel to AB and CD, ending in the Semicircle AEC, and on the Diagonal CB, from the Points on CB, erect Perpendiculars parallel to CN and BO, and to BK and AI, and the Lines LM and gH will be equal to FE; let the Lines be made on each Side of L on BC, and on each Side of g on AB, equal in Height to the Lines which are correspondent on each Side of F on AC, thro' the Points whereof describe the Arches AHB, and BMC, the Arch and Groin required. Observe, that the Arch B, M, C, serves also for DA the other Diagonal.



PROBLEM III.

When you have one given Center for a Rhombus Groin, to make a Description of the other in such a Manner as that the Mitre Arch shall be constructed by the Intersection, and be perpendicular over the Base.

Let the Diagonal AD and BC be first drawn; suppose AFB to be the given Center, then proceed as before directed on the four Sides, and the two Diagonals, and the Groins, will be constructed, which are required.

PROBLEM IV.

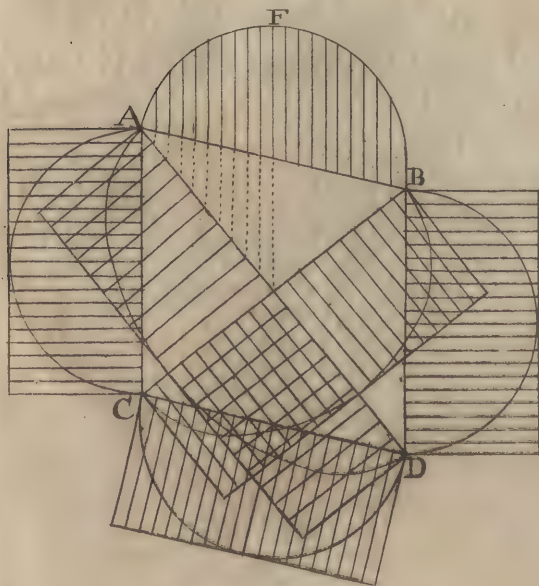
The Arch Line of a Cieling, or Vault, being given, which is supposed to be semicircular; for the Formation of the Curve of a lesser Arch which shall intersect the Side of it, in order to receive either Doors or Windows, in such a Manner as that the Groin shall be produced by their Intersection, and hang perpendicularly over the Base thereof; as likewise for the Formation of the Curve thereof.

Suppose ABCD to be the Angles of the springing Walls.

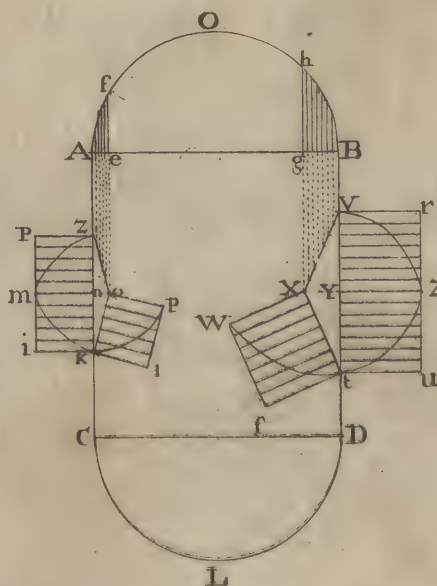
Draw the Semicircle AOB and CLD; on the Side BD set off the Spand of the Arch Vt, which intersects; upon the Points V and t, erect the Perpendiculars Vr and tu, equal to the Height intended of the Arch which intersects; describe the Line ru, divide it in the Middle at z; draw zy parallel to Vr and ut; produce zy as you think proper from the Point y on the Line AB, and the Point g, set the Height zy; on the Arch BOA, at the Point h, produce hg, till zy be intersected at the Point

Point x ; draw the Lines xu and xt ; on the Points x and t . erect the Perpendiculars xw and tf equal to gb ; draw the Line wf ; divide Bg into what Number of equal Parts you think proper. Thro' the Divisions on Bg , draw Parallels to gb ; on the Arc Bb , and the Lines xv , from the divisionary Points on the Line xv , by the Lines from Bg ; on Vy erect Perpendiculars to zr , and parallel to yz and vr ; erect on the same Number of equal Parts on yt and tx Perpendiculars parallel to yz , tu and tf , xw , set the Length of the Lines from Bg to the Bb , on the correspondent Perpendiculars from yv to zr , from yt to zu , from xt to wf , thro' the Points set off on the Parallels, the Arches required may be described (as in the preceding Example) Vzt and wt , Vzt is the Arch which intersects, and wt the Curve Line of the Groin which is correspondent to it. The Arches Kmz and KP are drawn after the same Manner.

problem. III.



IV.



PROBLEM

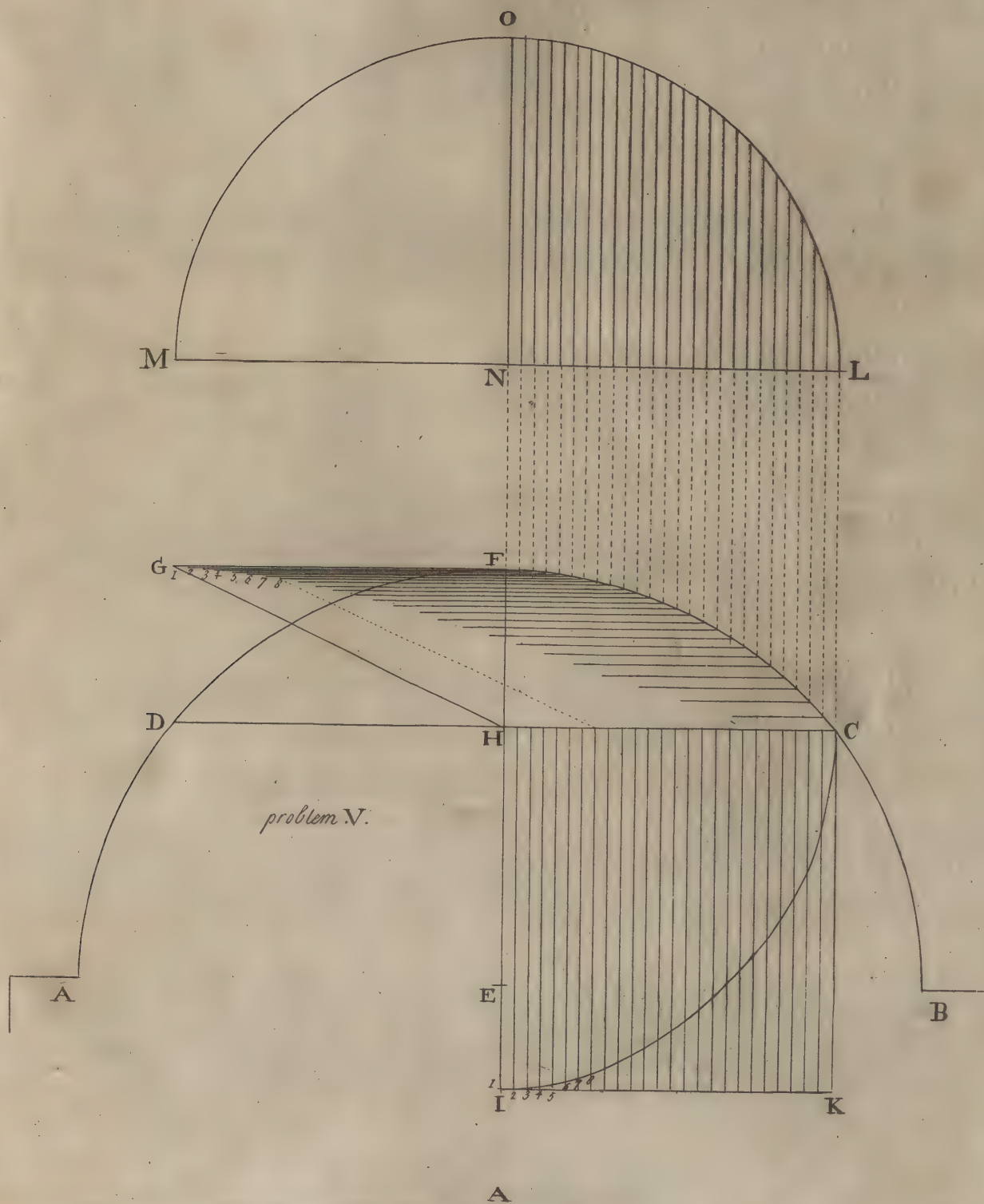
PROBLEM V.

The Arch of a Circular Wall, in which there is intended to be fixed a semicircular Window, being given; for the Formation of a Center to turn their Arches.

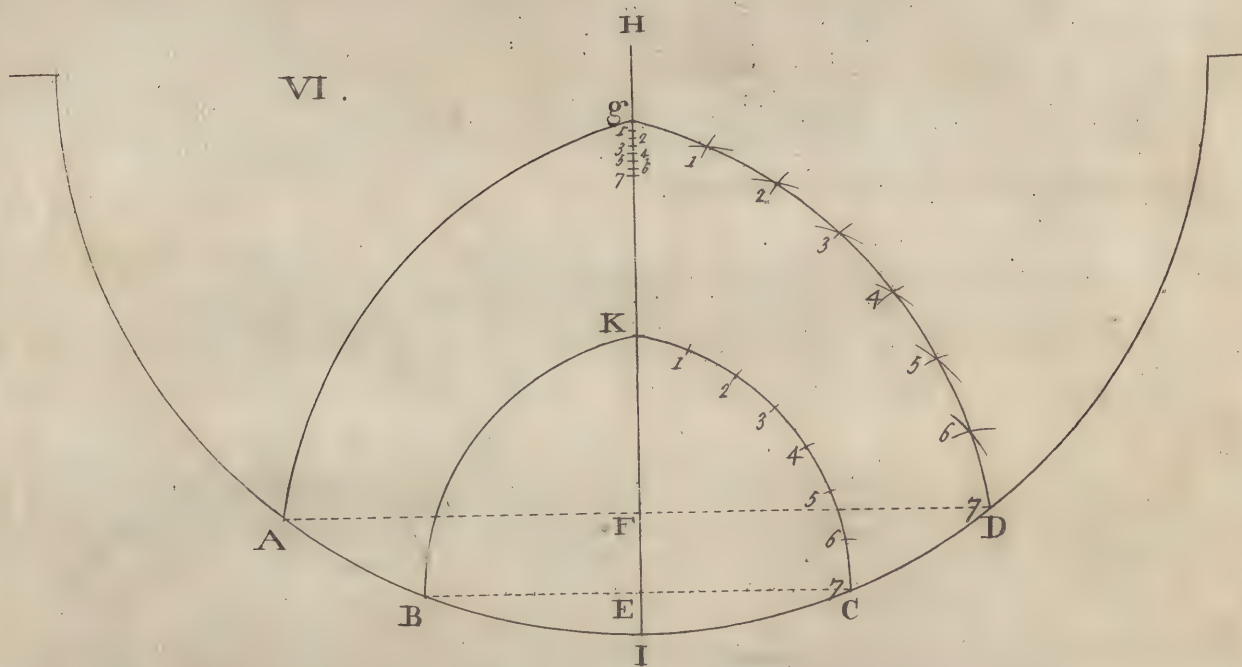
Suppose $A F B$ to be the Arch given of the Circular Wall, described by the Center E .

From the Center E erect the Perpendicular $E F$, at right Angles to $A B$, equally on each Side $E F$; on the Arch $A F B$, set the Width of the intended Window $C D$; draw LM parallel and equal to $C D$; let LM be divided at N into what Number of equal Parts you think proper; produce $E F$ thro' the Point N as far as O from the divisionary Points; on LN draw Perpendiculars parallel to $E O$, and abutting on the Arcs LO and CF ; from the Point F draw $F G$, parallel and equal to $H D$; draw the Line $H G$. Let the Line $H E$ be continued to I equal to $H G$; on the Point C let the Perpendicular $C K$ fall equal and parallel to $H I$; draw the Line $I K$; divide $H C$ into what equal Number of equal Parts you please to the Line LN ; from the divisionary Points on $H C$, draw Lines to $I K$, parallel to $H I$ and $C K$; from the Points of Division on the Arc CF , as continued from LN , draw Lines parallel to CD , and equal to the Lines which are correspondent on the Line LN , to the Arc LO ; from the Points of Division on CH , draw Right Lines to the extreme Points of the Lines from CF ; set the Length of the Lines from CH to the Lines from the Arc CF , on the Line $H C$ to the Line $I K$, as $H I$ is equal to $H G$, and so on towards C ; and set off thro' the Points on the Lines, from $H C$ towards $I K$; describe the Arc $C I$, which will hang perpendicular over the Arch $C F$, when it is set in its due Position.

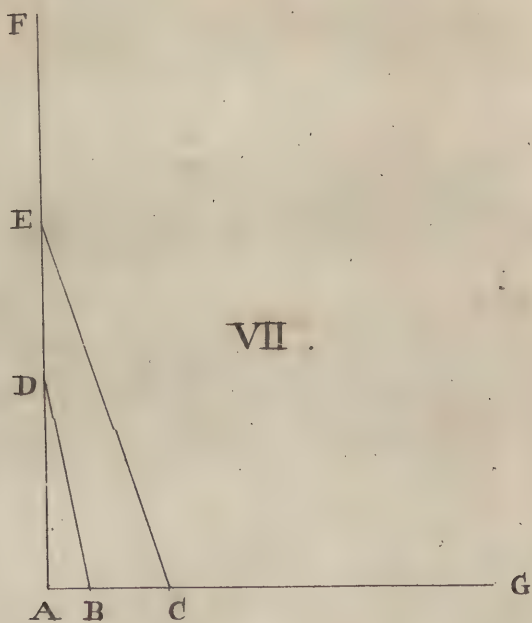
PROBLEM



VI.



VII.



A

PROBLEM VI. and VII.

The Center being given, on which the Arch of a Bow-Window is turned, for the Discovery of another Center parallel to it according to the upper Edge of the Arch's Surface.

Describe B K C by the preceeding Problem; set the flat Surface, or the Width of the Arch from B to A; and from C to D, draw the Lines A D and B C; let them be divided in the Middle at E F; draw the Perpendicular of Length, as you think convenient, to H, in any proper Place, as *Fig. 7*; draw a Line, as you please, as A G; upon the Point A erect the Perpendicular A F; then take E I, in *Fig. 6*, and set it from A to B in *Fig. 7*, and E F from B to C; take the Semi-diameter B E, or E C, *Fig. 6*, and set it from A to D, *Fig. 7*; take likewise A B, or C D, *Fig. 6*, and set it from D to E, *Fig. 7*, and draw the Line E C on the Point F with the Length C E; on the Line I H make the Point g. Take the Width of the flat Surface of the Arch A B, or C D, and set it on K to 7 on the Line E H; and let the Remainder from 7 to g be divided into seven equal Parts; let the Arch B K be divided likewise into seven equal Parts; take K 1 on the Line E H, upon the Point 1; on the Arc B K, with the Interval K 1 describe the Arc 1, as you see convenient; with the Interval K 2, on E H, upon the Point 2, on the Arc B K, describe the Arc 2; take likewise K 3, K 4, K 5, and K 6, separately, and describe the Arcs 3, 4, 5, and 6; make a Division upon those Arcs from A to g in seven equal Parts; and thro' the Points of those equal Parts, describe the Arc A g, according to the Directions in *Prob. I.* and the Arc D g may be drawn after the same Manner, by which the Arch-Line required is completed.

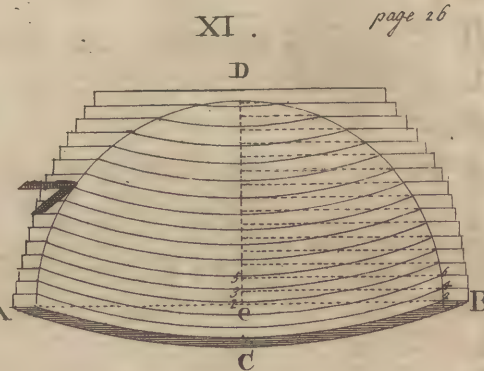
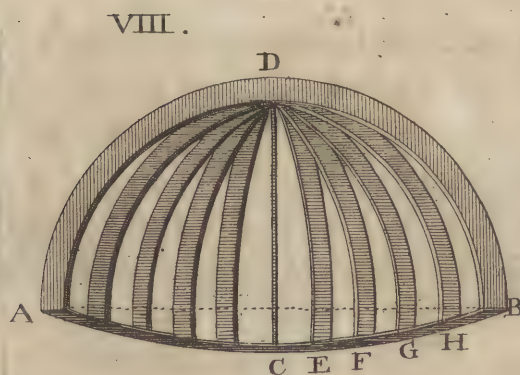
E

PROBLEM

PROBLEM VIII.

For the Formation of a Semi-circular Nich, with Ribs, as is customary when the same is propos'd to be plaistered.

Describe the Semi-circular Plate $A B C$, and the Semi-circular Front Rib $A D B$, equal to $A B C$; fix the latter level where it is propos'd to be continued; on $A B$ set the Front Rib $A D B$ perpendicular; describe the Quadrantal Ribs $D C$, $D E$, $D F$, $D G$, and $D H$, each of them equal to $A D$, or $B D$, and at a proper Distance, on the Plate $A C B$, and at C , E , F , G , and H , in such a Manner as to meet in one Point at D , on the Crown of the Front Rib $A D B$, which completes one Half of the Operation; and the Remainder may be finished after the same Manner.



PROBLEM

PROBLEM IX.

For the Formation of a Semi-circular Nich by the Thicknesses of Planks or Boards, and to discover the Bevels to each respective Thickness.

Describe the Semi-circle on the Front of the Nich A D B ; make a Division of the Height *e* D into equal Parts, in Proportion to the Thickness of the Plank or Board which you propose to make the Nich of. Describe the Thickness from whence the Bevels must be taken, and draw Lines at the End of the prick'd Lines in the *Example* : Take the prick'd Line 1 2, in your Compasses, or the under Side of the Plank or Board whereof you propose to make the first Thickness ; describe a Semi-circle from 1 equal to A D B ; the Semi-diameter being equal to the prick'd Line 1 2, strike a square Stroke on the Edge from 1, in order to discover the Center for the Semi-circle on the upper Side of the first Thickness, as at 3 ; take the prick'd Line 3, 4, upon the Point 3, describe the Semi-circle, the Semi-diameter whereof is equal to the prick'd Line 3, 4 ; an Arch being first describ'd on each Side of the first Thickness ; cut directly thro' the Arch-Line, with a narrow turning Saw, on each Side of the Plank or Board, and by that means you will have the true Bevel and Curve of it. In order to describe the Bevel of the second Thickness, describe the last drawn Semi-circle on the under Side of it, in the same Manner as you did on the upper Side of the first Thickness 3, 4, being the Semi-diameter. Strike a square Stroke from 3 on the Edge of the Plank or Board, in order to discover the Center for the Semi-circle on the upper Side of this second Thickness ; on the Point 5, with the Interval 5, 6, on the upper Side of the second

E 2 Thickness

Thickness describe the Circle, the Diameter whereof is equal to 5, 6; cut thro' the two Arches in the first Thickness with a turning Saw, and the Arch-Line and Bevel of the second Thickness will be given. In order to discover the Arch-Line and Bevel of the third Thickness, you are to follow the same Rule as in the first and second, and so of the rest. When you have your Thickness prepared. according to their exact Arches and Bevels, let the Glue, in which you set them, be good, and well made, and let it stand till it be perfectly dry, and with a *Compass smoothing Plane*, somewhat quicker than the Arch of the Work, plane the Inside of it till it be fit for the Design propos'd.

PROBLEM X, XI, and XII.

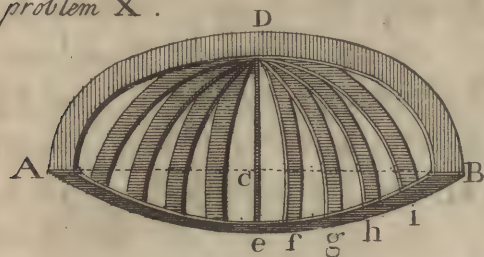
For the Formation of the Elliptical Nich by Ribs for Plaistering, &c.

Describe the Plate whereon the Ribs should stand ; K, *n*, *m*, Fig. 11, being a Semi-ellipsis, equal to ADB, or A *e* B, Fig. 10, the pricked Lines *ln*, *lo*, *lp*, *lq*, *lr*, and *lm*, Fig. 11, represent the Base Lines of the Ribs D *e*, D *f*, D *g*, D *h*, D *i*, and D B, Fig. 10. The Lines *st*, *su*, *sw*, *sx*, and *sy*, are Base Lines, and the Perpendiculars *at*, *bu*, *cv*, *dw*, *ex*, and *fy*, Fig. 12, represent the Rising of the Ribs *e* D, *f* D, *g* D, *h* D, *i* D, and B D, Fig. 10, which, in Length, is equal to C D; you must observe, however, that the different Arch of each Rib must be described within those Lines ; that is to say, the Arch *sa*, Fig. 12, is a Quadrant of a Circle, which hath *t* for the Center of it, and is equal to the Arch of the Rib *e* D. The Lines *us*, *sx*, equal to *zb*, *bu*, are the Semi-transverse, and Conjugate Axes of a Semi-ellipsis, the Arch whereof, *sb*, Fig. 12, is equal to the Arch of the Rib *f* D, Fig. 10, which may
either

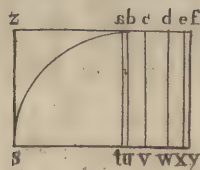
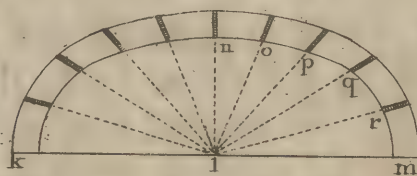
either be described by the Trammel, or the Interfection of Lines. The Lines fz , fv , equal to vc , cz , are the Semi-transverse and Conjugate Axes of a Semi-ellipsis, the Arch whereof is equal to the Arch of the Rib gD , and proceed in the same Manner for the Remainder.

When you have the Ribs all ready, set the Front Rib ADB perpendicular on the Plate AeB , as at AB , and fix the Feet of the short Ribs on the Plate AeB , as at e, f, g, h, i , *Fig. 10*, which are correspondent with the Points n, o, p, q, r , *Fig. 11*, and their Points a, b, c, d, e , *Fig. 12*, to the Crown of the Front Rib at D , *Fig. 10*; and after this Manner the Operation proposed may be accomplished.

problem X.



XI.



XII.

PROBLEM

PROBLEM XIII, XIV, XV, and XVI.

For the Formation of an Elliptical Nich by the Thicknesses of Planks or Boards.

Describe the Figures 13, 14, 15, and 16, according to the preceding Problems.

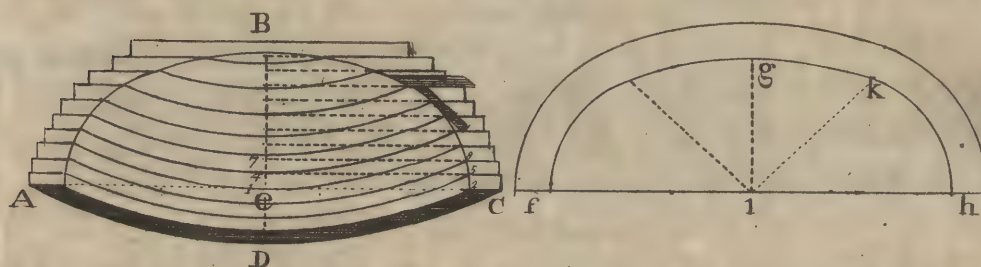
The Arch $A B C$ and $f g b$ are Semi-ellipses, and equal to each other. The Arch $l n$ is a Quadrant of a Circle, and the Arch $O P$ is a Quadrant of an Ellipsis, which are the two most different Arches of the Nich. The Arch $f g b$ represents the first Thickness, and is equal to $A C D$. The Perpendiculars $m n$ and $g p$ are equal to $e B$, and the Base Line $l m$ is equal to $i g$. The Base Line $o g$ is equal to $i k$, the Arches whereof $l n$, $o p$, with their Bevels, stand perpendicularly over $i g$ and $i k$. On the under Side of the Plank or Board whereof you propose to make the first Thickness, describe a Semi-Ellipsis equal to $A D C$, or $f g b$, the Semi-transverse Axis whereof is equal to the pricked Line 1, 2, and Semi-conjugate to 1, 3; then strike a square stroke at 1, on the Edge of the Plank or Board, in order to discover the Middle of the Base to the Elliptic Arch on the upper Side of the first Thickness at 4, the Semi-transverse whereof is equal to the pricked Line, 4, 5, and the Semi-conjugate equal to the pricked Line, 4, 6, by Virtue whereof describe an Elliptic Arch on the upper Side of the first Thickness; then, by Virtue of these two Elliptic Arches thus described, on the upper and under Sides of the Piece, saw out the Curve and Bevels of the first Thickness with a turning Saw, in order to find the Arch and Bevels of the second Thickness; on the under Side of the Plank or Board, whereof you propose to

to make it, describe an Elliptic Arch equal to that upon the upper Side of the first Thickness, the Semi-transverse and Semi-conjugate Axes whereof are likewise equal to the pricked Lines 4, 5, and 4, 6. Then strike a square Stroke on the Edge from 4, in order to discover the Middle of the Base Line to the Arch on the upper Side of the Second Thickness, the Semi-transverse whereof is equal to the pricked Line 7, 8, and the Semi-conjugate is equal to the pricked Line 7, 9; and saw out the Arch and Bevels thereof with a Saw as before mentioned; and so proceed with respect to the rest.

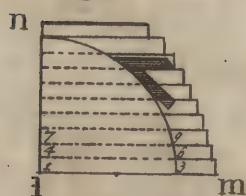
XIII.

XIII.

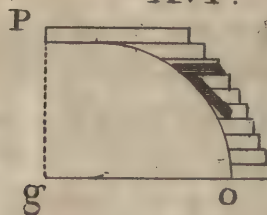
page 31



XV.



XVI.



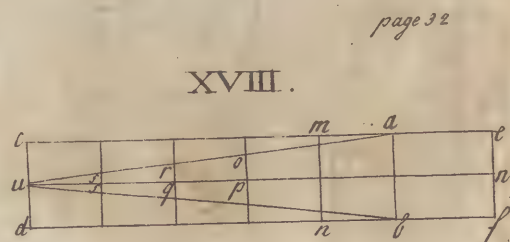
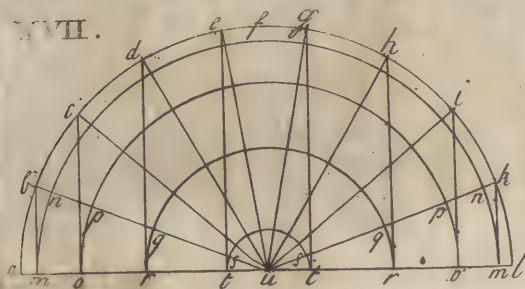
PROBLEM

PROBLEM XVII, and XVIII.

For the Formation of a Nich or Globe with thin Boards, in order for their being covered with Paper or Pasteboard.

Suppose $a f l$, *Fig. 17*, to be the Plan of a Semi-circular Nich, and $c e f d$, *Fig. 18*, to be the Board, Paper, or Pasteboard of a given Width, either that of $c d$, or $e f$.

Divide the Semi-circle $a f l$ into equal Parts according to the Breadth of *Fig. 18*, as $a b$, $b c$, $c d$, $d e$, $e g$, $g h$, $h i$, $i k$, and $k l$; draw the Lines $b u$, $c u$, $d u$, $g u$, $h u$, $i u$, $k u$, and let Perpendiculars fall on the Line $a l$, from the Points b , c , d , e , g , h , i , k . Describe Semi-circles upon the Center u , with the Intervals, m , o , r , and t ; set the Girt of the Arch $a f$, or $f l$, on the Board, &c. *Fig. 18*, as $c a$, and $d b$, which divide into as many Parts as you observe there are Semi-circles. Divide in the Middle, as by the Line $u w$, *Fig. 18*; take the Arch $a b$ and set it in equally on each Side the Line $u w$, as at $a b$; set the Arch $m n$ after the same manner on $u w$, as at $m n$, and so on to $t f$; then let small Tacks be stuck in at the Points a , m , o , r , t and u , on one Side of $u w$, and at the Points b , n , p , q and f , on the other Side $u w$; by the Application of a thin Ruler from a to u , and b to u , the Curve Lines will be given which are on each Side, and may be drawn by a Pencil, &c. And this is the true Mold for every Piece in the Globe or Nich required.









A

DISSERTATION ON ARCHITECTURE.



The Principal Parts of the TUSCAN ORDER. Plate I.



NY Height being given for this whole Order, divide it into ten several Parts, and take two for that of the Pedestal ; divide the remaining eight Parts into five, and one will be the Altitude of the Entablature ; the other four is for the Length of the Column, the Base and Capital included, so that the Entablature is, by that Means, made One-fourth of the Length of the Column.

F

The

The Entablature before-mentioned being divided into seven Parts, two are for the Architrave, two for the Freeze, and three for the Cornice: Observe likewise, that four of these Parts are the Diameter of the Column.

The Altitude of the Pedestal is divided into six Parts, two being for the Base and Plinth, three for the Altitude of the Dado, and one for that of the Cap.

In order to find out the Breadth of the Dado, the Diameter of the Column is divided into five Parts, and seven such Parts is the Breadth, and is the Projecture likewise of the Base of the Column.

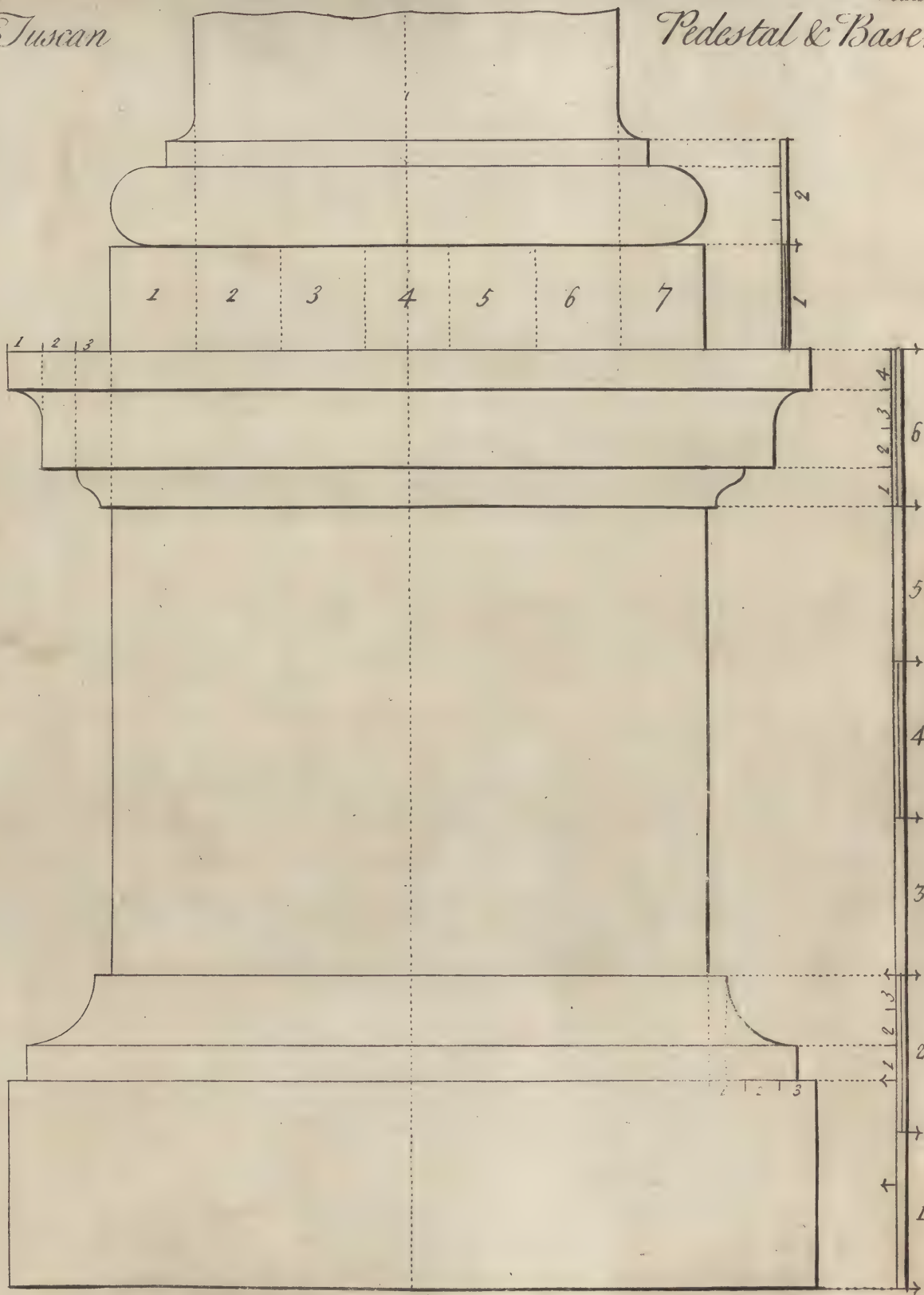
The Base of the Pedestal is found by the Division of the Two Parts, allotted for the Base and Plinth, into three, allowing one to the Base, and two to the Plinth; the Projecture of the Cap, and Base of the Pedestal, is equal to the Altitude of the said Base.

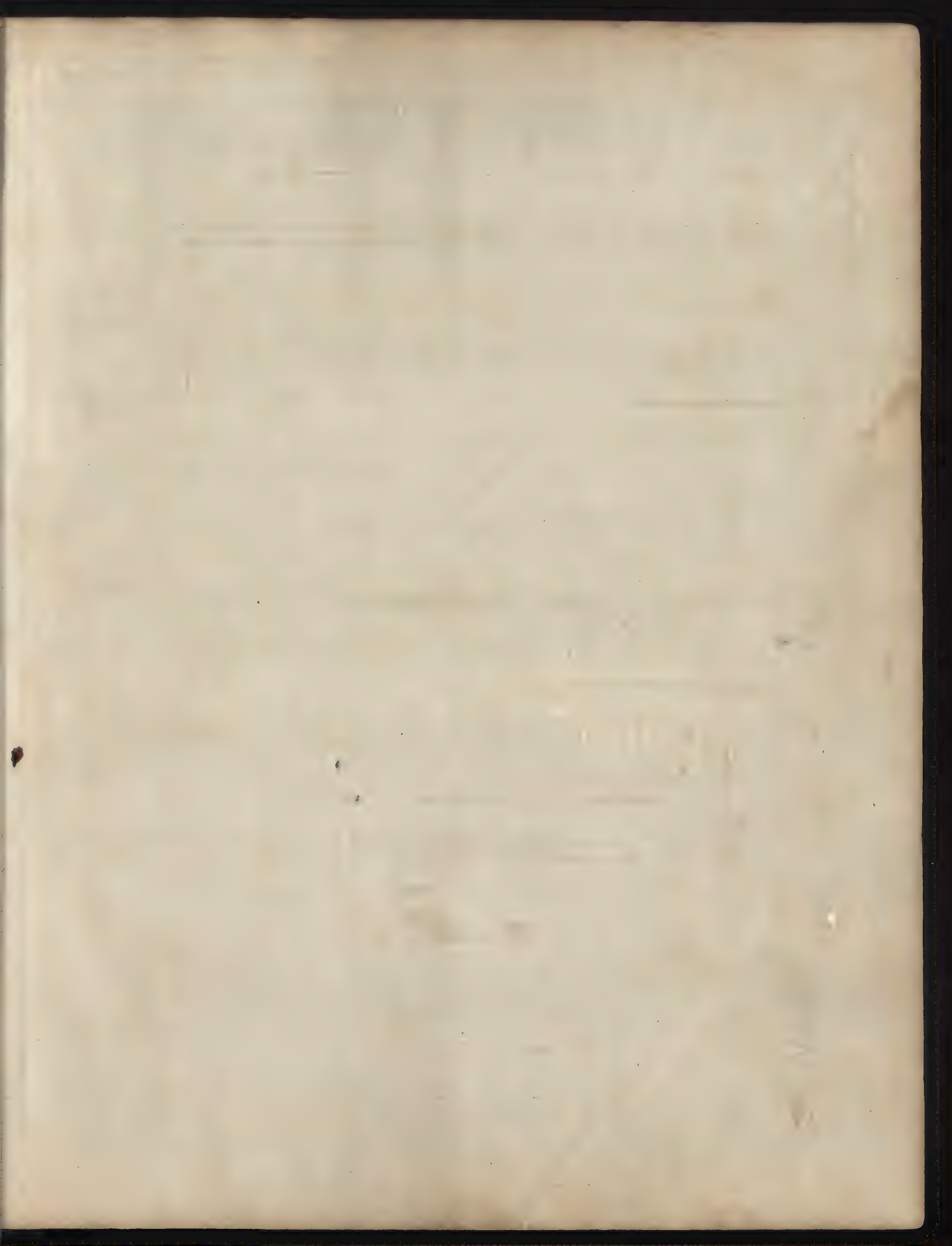
In order to diminish the Shafts of the Column, take the Diameter with your Compasses, and you will find it six times contained between the Base and Capital; at two of which, from the Base, make a Semicircle, as, *a*, 3, *f*. Then let fall a Perpendicular from the Diameter at Top, and cut the Semicircle at 4; after that divide the Part of the Semicircle so cut off into four Parts, because four Parts of the Shaft remain above, as 1, 2, 3, 4, and raise Perpendiculars from the said Points, to the correspondent Divisions, which will form the Regular Curve for the Swelling *a*, *b*, *c*, *d*, *e*.



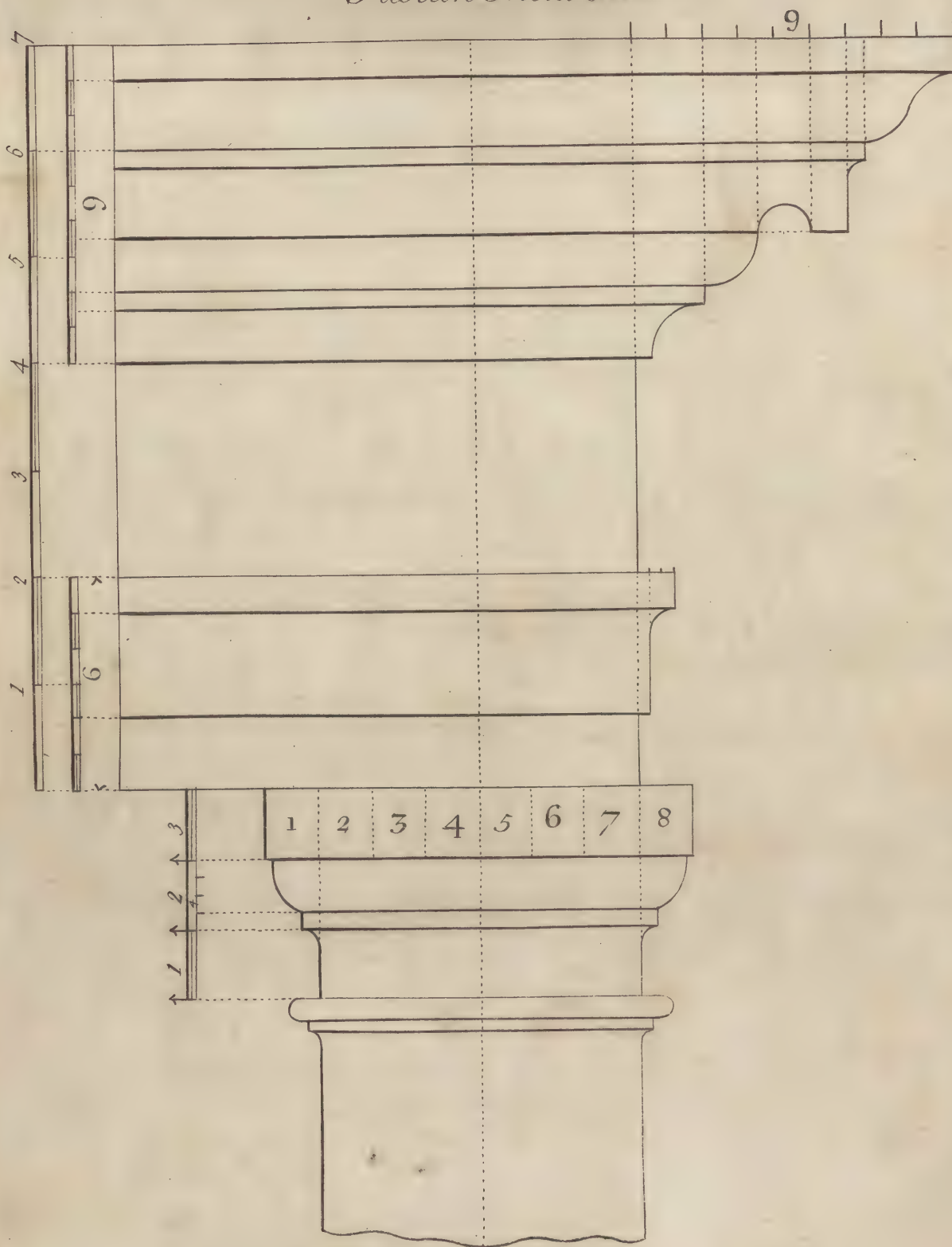
Tuscan

Pedestal & Base.





Tuscan Entablature



*The TUSCAN Pedestal, and part of the Shaft of the Column
and Base. Plate II.*

The Altitude of the Base of the Column is half a Diameter, and is divided into two, allowing one to the Plinth; the other Part is divided into four, giving one to the Fillet, and three to the Torus.

The whole Projection is One-fifth of the Diameter of the Column, and the Fillet projects equal to its Altitude.

The Altitude of the Pedestal's Base, Plinth and Cap, was shewn before; but for the several and respective Members, the Base is divided into three, allowing one to the Fillet, and two to the Hollow.

The Altitude of the Cap is divided into four, allowing one to the Ogee, two to the Corona, and one to the Band at Top. As for the Projections, they are both equal to the Altitude of the Base, and both being divided into three Parts, the Projection of the several Members are (without the least Difficulty) conceived by Inspection.

The TUSCAN Entablature and Capital. Plate III.

The whole Altitude of the Entablature being one Diameter and Three-fourths, as we have shewn before, and the principal Height of the Architrave, Freeze, and Cornice being set off, as for the particular Members; the Architrave is divided into six Parts, allowing two to the first Face, three to the second, and one to the Band at Top. The Projection is equal to the Altitude of the first Band, and the second Face hath one-third.

The Altitude of the Cornice is divided into nine Parts, (*i. e.* each Principal Third into three) allowing one and half to the Hollow, half to the Fillet, one and a half to the Ovolo, two to the Corona, half to a Fillet, two to the Scima Recta, and one to the upper Fillet. The Projection is equal to its Altitude, and contains the same Divisions, so that the Severals are so obvious by Inspection of the Scales only, that it would be needless, if not impertinent, to say any more relating thereto.

The Capital is half a Diameter in Height, and divided into three Parts, allowing one to the Freeze of the Capital, another to the Ovolo and Fillet, which is one-fourth, and the other Part to the Abacus.

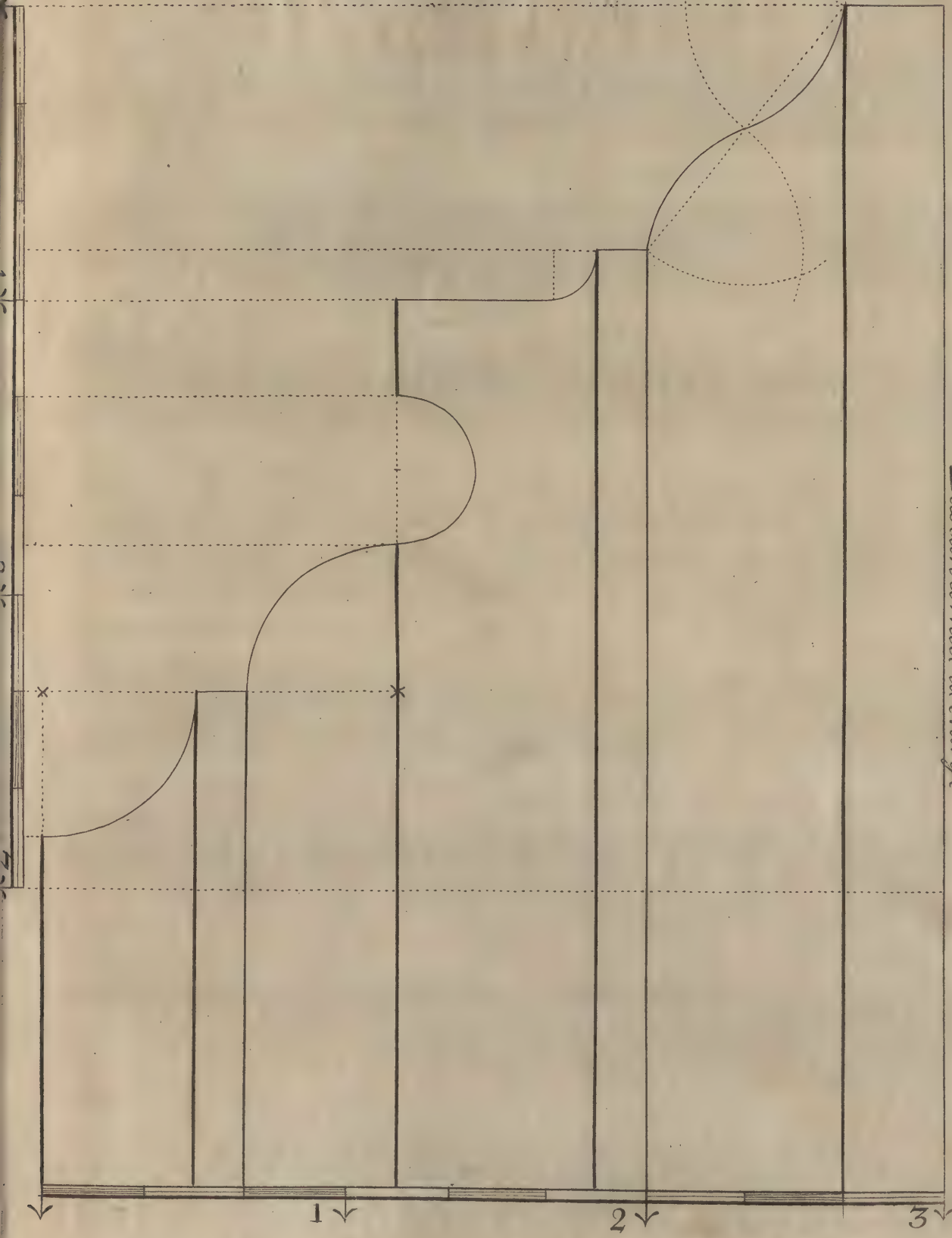
The Projection is one-eighth of the Diameter, which gives the Diameter likewise of the Column at Top. The Fillet is equal to the Height.

The Astragal, or Collerino is one-third of the said Freeze of the Capital in Height, and the Fillet the half thereof, and is equal to the Height in its Projection.

Note. The Proportion for this Moulding, serves for all the Orders in general.

The TUSCAN Cornice Enlarged. Plate IV.

Observe that in this, and all the rest of the Cornices, the principal Divisions are preserved, both with Respect to Height and Projection; and are introduced again with no other Intent but to corroborate the Rules, and to shew the Method of forming the several and respective Mouldings, which is discernable by Inspection.



Tuam lighthouse at large



The Principal Parts of the DORIC ORDER. Plate I.

ANY Altitude being proposed for this whole Order, divide it first into ten Parts, allowing two to the Pedestal, and divide the remaining eight Parts into five; then give four to the Length of the Column, including the Base and Capital; the other one is reserved for the Entablature, which must be divided into four Parts, two whereof will be the Diameter of the Column: Thus the Column will be eight Diameters high, and the Entablature one-fourth of the Length of the Column. The Entablature being divided into four, one must be given to the Architrave, one and an half to the Freeze, and one and an half to the Cornice. The Architrave projects one-sixth of its Height, and the Cornice projects a Diameter of the Column; that is to say, four such Parts, as it is three in Height. The Height of the Pedestal is divided into seven Parts, allowing two to the Base and Plinth, four to the Dado, and one to the Cap.

The Column is diminished one-sixth of the Diameter from one-third of the Length of the Shaft; and if the Diameter at Bottom be divided into five, the Base of the Column will project on each Side one of these Parts, which gives the Breadth of the Dado of the Pedestal, and by that Means makes it a Square.

The Base of the Pedestal is one-third of the two Parts for the Base and Plinth, and its Projection equal to the Height, and the Cap projects four-fifths of the Height.

The

The DORIC Pedestal, and Part of the Shaft of the Column and the Base. Plate V.

The Height of the Base of the Column is half the Diameter, and the Projection gives the Breadth of the Pedestal, which is a Diameter and two-fifths. The Height of the Pedestal's Plinth, Base, and Cap, was shewn in the foregoing Plate; but for the particular Members, divide the Height of the Base into six, giving three to the Torus, one to the Fillet, and two to the Hollow; the Projection being the same Parts, each Member is easy to set off by Inspection. The Cap is divided into five Parts, giving one to the Hollow, half a-part to the Fillet, one and an half to the Ovolo, one and an half to the Corona, and half a Part to the Fillet at Top. The Projection hath four of these Parts, and the several Members may appear by Inspection.

The Height of the Base of the Column is divided into three Parts, one being for the Plinth, the half of another is for the upper Torus, and the half of the Remainder for the lower Torus; then the remaining three-fourths is divided into six, giving one to each Fillet, and four to the Scotia. The whole Projection is one-fifth of the Diameter, and dividing it into three, one is for the upper Fillet (which is part of the Column, and is double the Height of the others) another for the upper Torus; all which, by due Inspection, will appear.

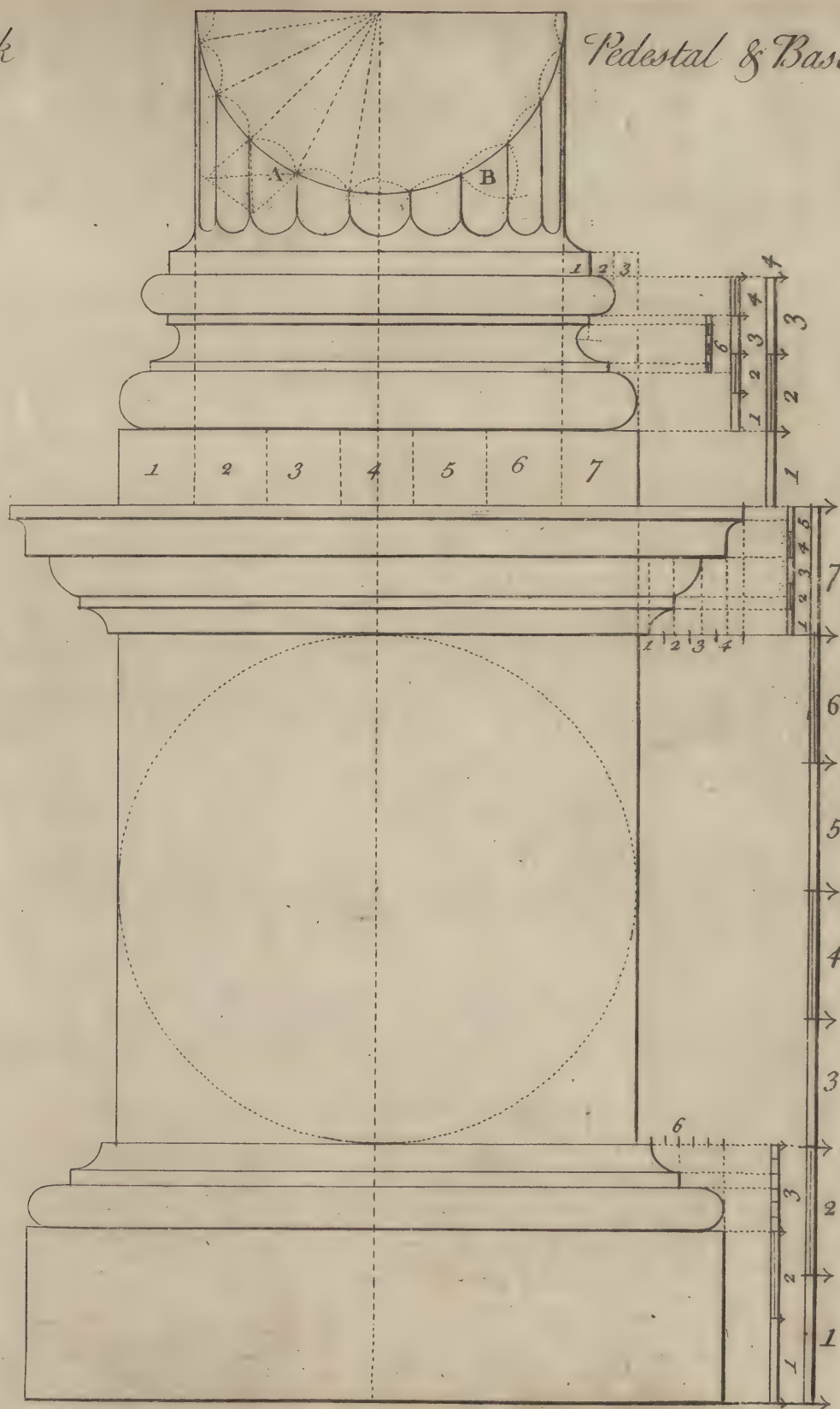
When the Column is fluted, they must have twenty in Number, and are fluted to an Edge, some making their Form, or Depth, by the Center being in the Middle of a Square, as A; others, by the Point of an equilateral Triangle, as B, as is shewn by the Plan at Top.

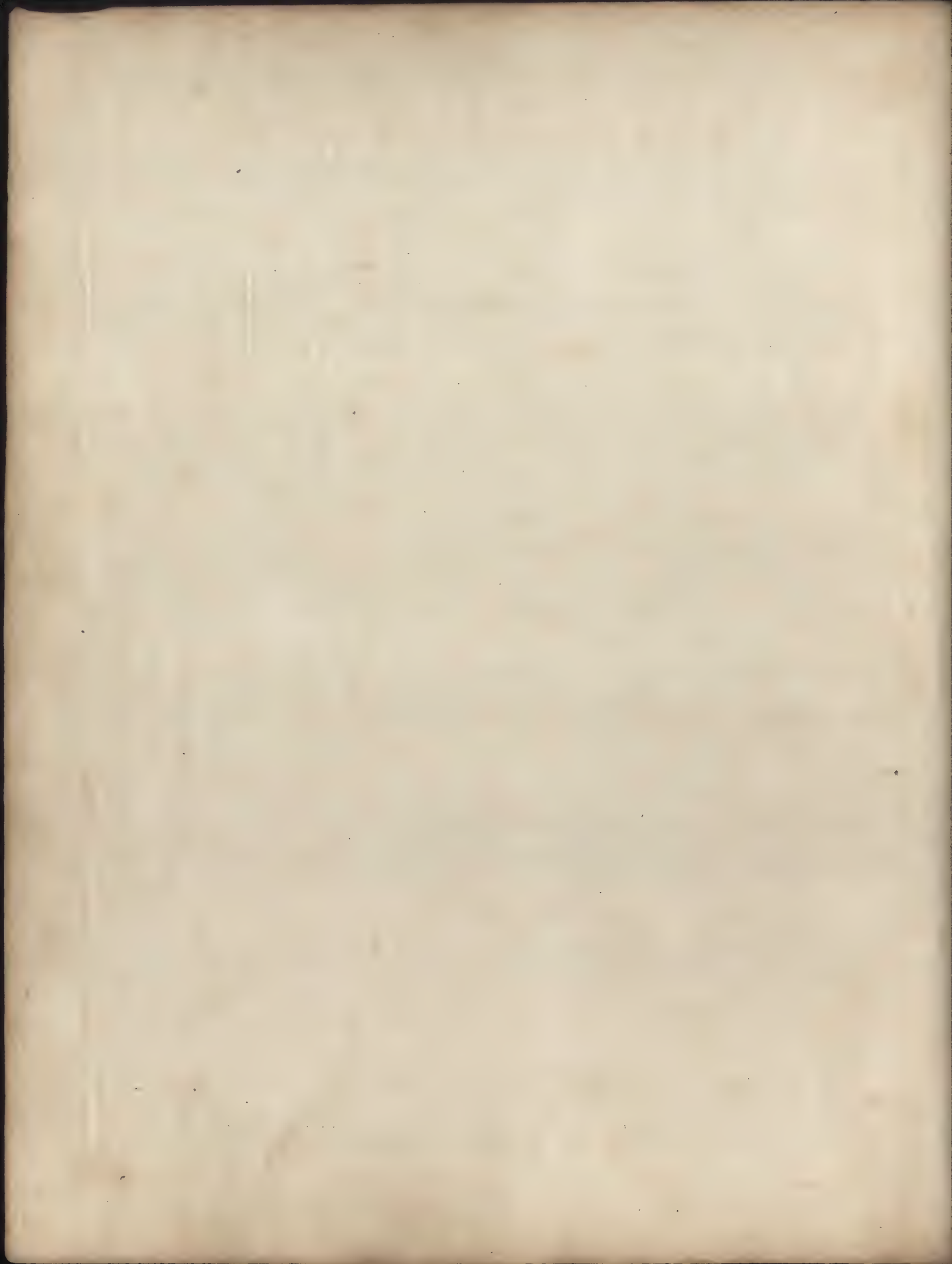
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Plate V.

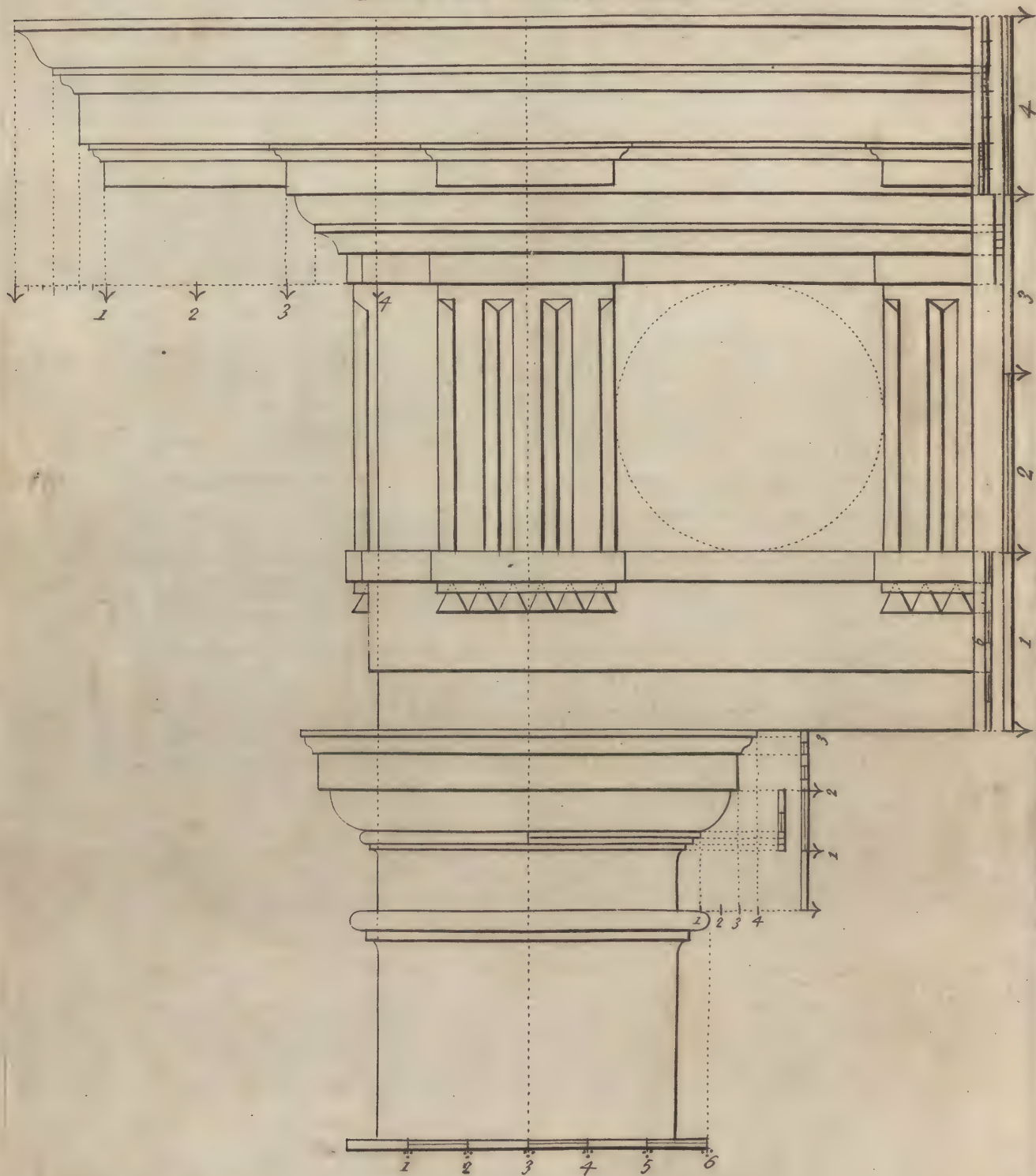
Pedestal & Base.







Doric Entablature



The DORIC Entablature and Capital. Plate VI.

The whole Height of the Entablature, being two Diameters, is divided into four, as before mention'd; the Architrave having one, the Freeze one and an half, and the Cornice one and half. As for the particular Members, the Architrave is divided into six; two being for the first Face, three for the second, and one for the Band at Top. The Guttæ, or Bells, have one of these Parts, and their Fillet hath one-third Part thereof. The Projection is likewise one of these Parts. The Freeze is adorned with Triglyphs, which are half a Diameter in Breadth, one whereof must be placed over the Middle of the Column, and the Metop, or Space between, must be equal to the Height of the said Freeze. The said Triglyphs are divided into twelve Parts, allowing one to each half Channel, two to each whole Channel, and two to each of the Spaces between the Channels. The Projection of the said Triglyph is one and a half of these Parts. The Height of the Cornice is divided into three, and the lower Part divided again into three; one gives the Cap of the Triglyph, one the Hollow and Fillet, (which is one-fourth) and the other the Ovolo. The other two Parts are divided into seven, allowing two to the Mutule and Cap, two to the Corona, one to the Scima Reverfa and Fillet, and two to the Scima Recta and Fillet; the smaller Divisions are discovered by Inspection. As to the Projections, the Whole being four such Parts as the three in Height, the first of them is again divided into three, allowing one to the Cap of the Triglyph, another to the Cavetto, and the other to the Ovolo. The
outer

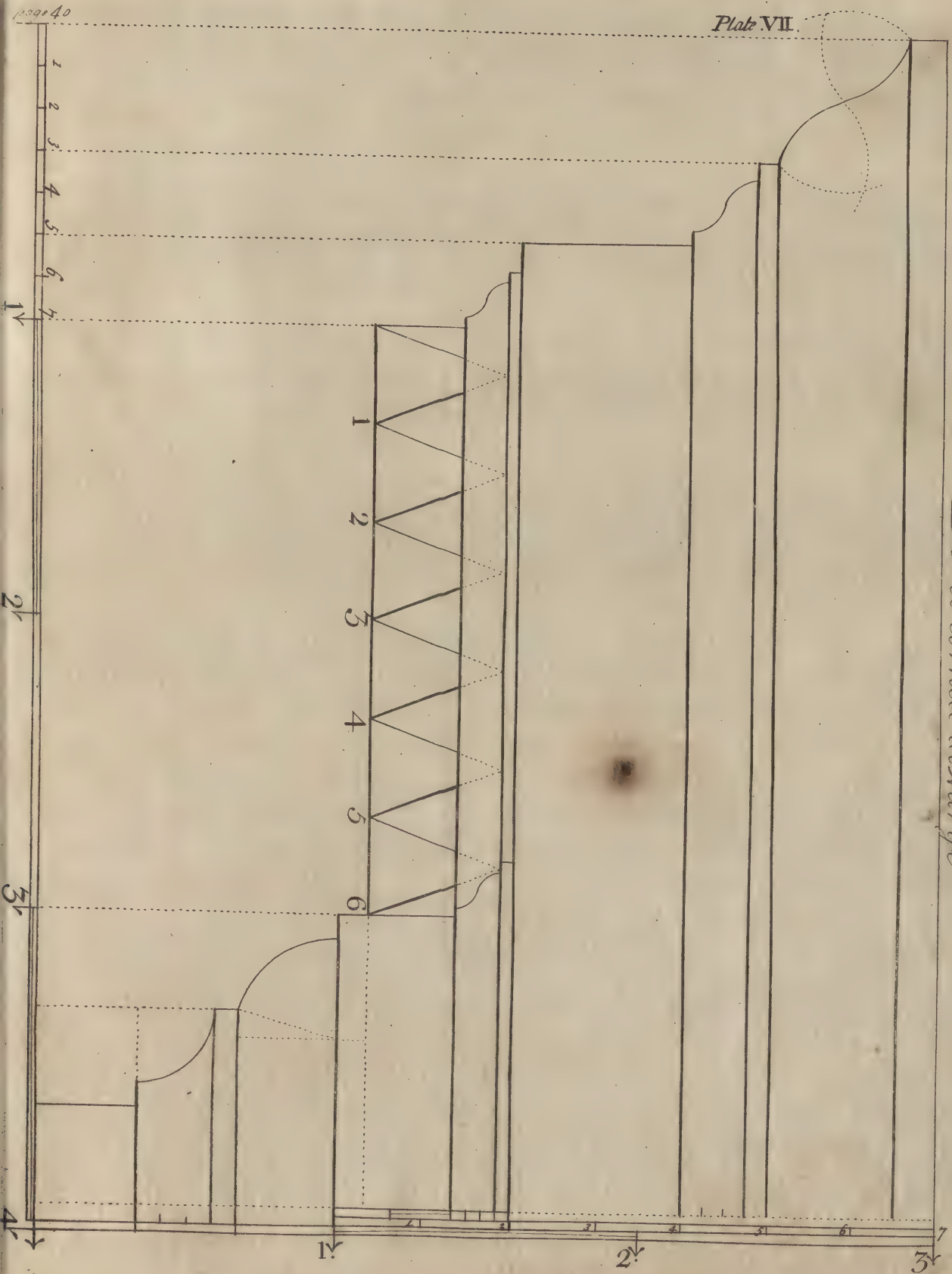
outer Part is likewise subdivided into seven, which regulates the Scima's and Corona ; all which is clear by Inspection.

The Height of the Capital being divided into three, one gives the Freeze of the Capital, another the Fillets and Ovolo, and the third the Abacus, Scima Reversa and Fillet ; but to be more particular, the Middle Part is divided into three, allowing one to the Fillets, which are three, and equal ; or (as on the other Side) one to a Fillet, and two to an Astragal ; the upper third Part divide into five, allowing three to the Abacus, and two to the Scima Reversa and Fillet, which is one-third. The Projection is equal to the Height of the Freeze and Fillets together ; and being divided into four, the rest will be seen at once.

The DORIC Cornice Enlarged. Plate VII.

In this Plate likewise, the principal Parts, or Divisions, are preserved, and the Method of forming the various Mouldings plainly illustrated ; and (as is requisite sometimes, especially in such Works as are not exposed to the Weather) here is shewn the Manner of making the Bells in the Mutules, which must be six in Front, and six in the Projecture, being thirty-six in each. Their Formation is manifest by the Plate.

Doric Cornice at large

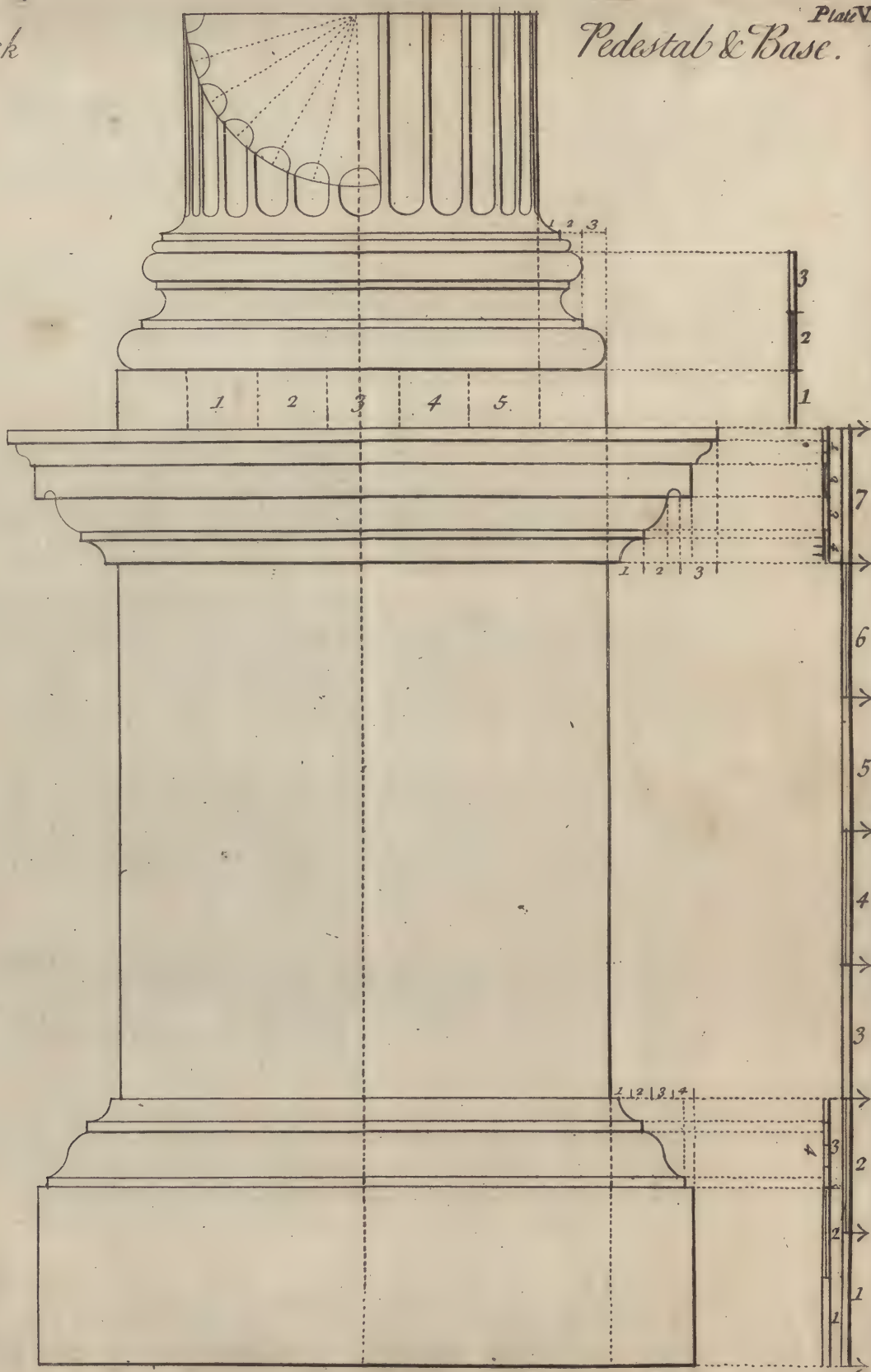






Ionick

Pedestal & Base.





The Principal Parts of the IONIC ORDER. Plate I.

ANY Height whatever being given for this whole Order, divide it into ten Parts, allowing two to the Pedestal, and divide the remaining eight into six, giving one to the Entablature, and five to the Length of the Column, inclusive of the Capital and Base. The said Length being divided into nine Parts, one will be the Diameter of the Column, which must be found to regulate some of the smaller Members following.

The Height of the Entablature is divided into six, allowing two to the Architrave, one and an half to the Freeze, and two and an half to the Cornice. The Architrave projects one-fourth of its Height, and the Cornice equal to its Height. The Height of the Pedestal is divided into seven Parts, allowing two to the Base and Plinth, four to the Dado, and one to the Cap.

The Column is diminished one-sixth of the Diameter, from one-third to the Length of the Shaft, in the same Manner as the last Order was, and the Base of the Column projects the same, which gives likewise the Breadth of the Dado of the Pedestal.

The Base of the Pedestal is one-third of the two Parts given for the Base and Plinth, and the Projection thereof equal to the Height, and the Cap projects three-fourths of its Height.

The IONIC Pedestal and part of the Shaft of the Column, and the Base. Plate VIII.

The Height of the Base of the Column is half the Diameter, and the Projection one-fifth Part of the whole Diameter, which gives the Breadth of the Pedestal.

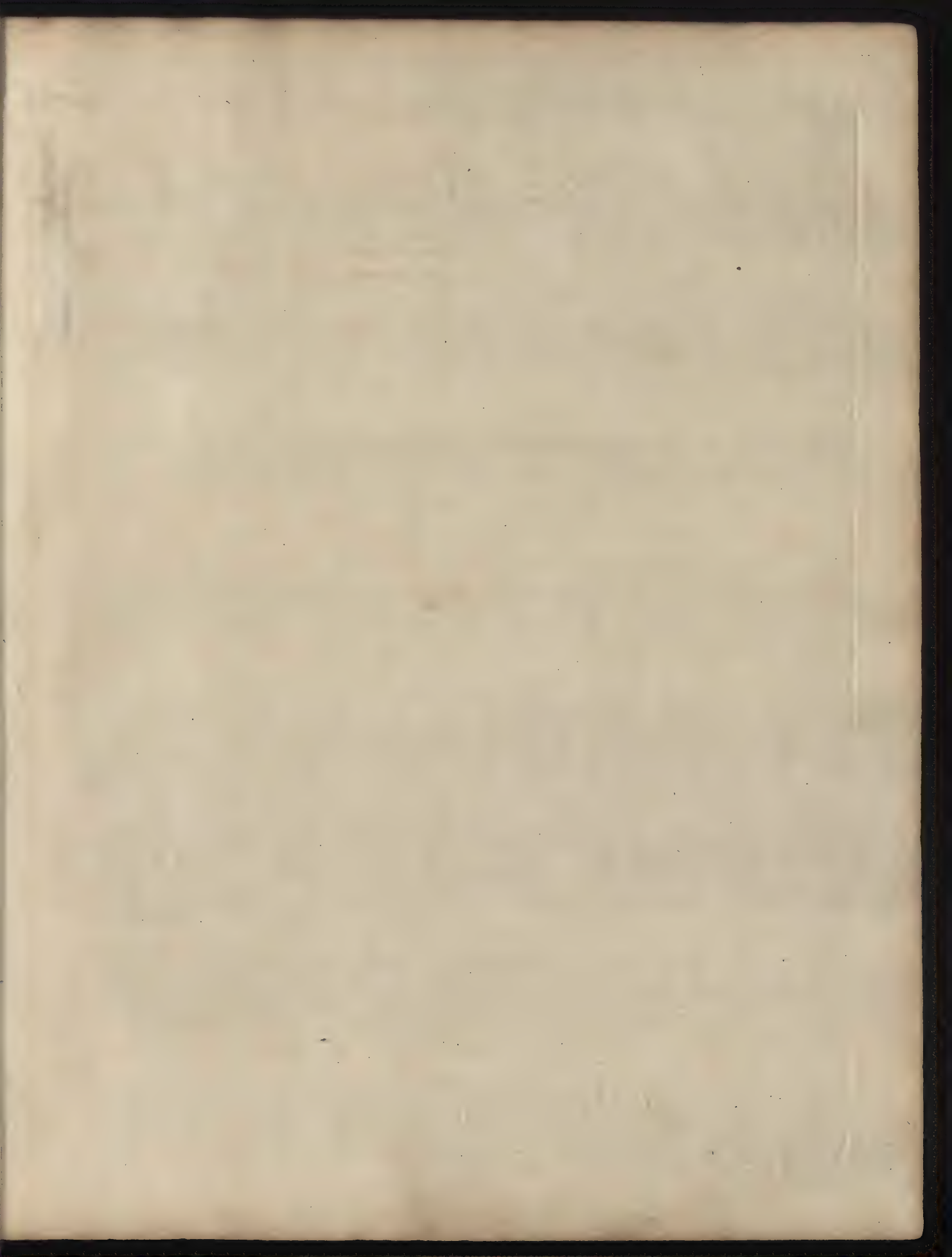
The whole Height of the Pedestal's Plinth, Base, and Cap, was before fully illustrated; but as for the particular Members, divide the Height of the Base into four Parts, allowing half a Part to the Fillet, two to the Cymase, one half Part to the Fillet, and one to the Hollow. The Projection being equal to the Height, and divided into the same Number of Parts, each Member appears by Inspection.

The Cap is divided likewise into four Parts, allowing one to the Hollow and Fillet, which is one-fourth, another to the Ovolo, another to the Corona, and one to the Ogee and Fillet, which is one-third. The whole Projection is three of the four Parts of the Height, and each third being divided into three, they are set off, as, by inspecting the Plate, may be seen.

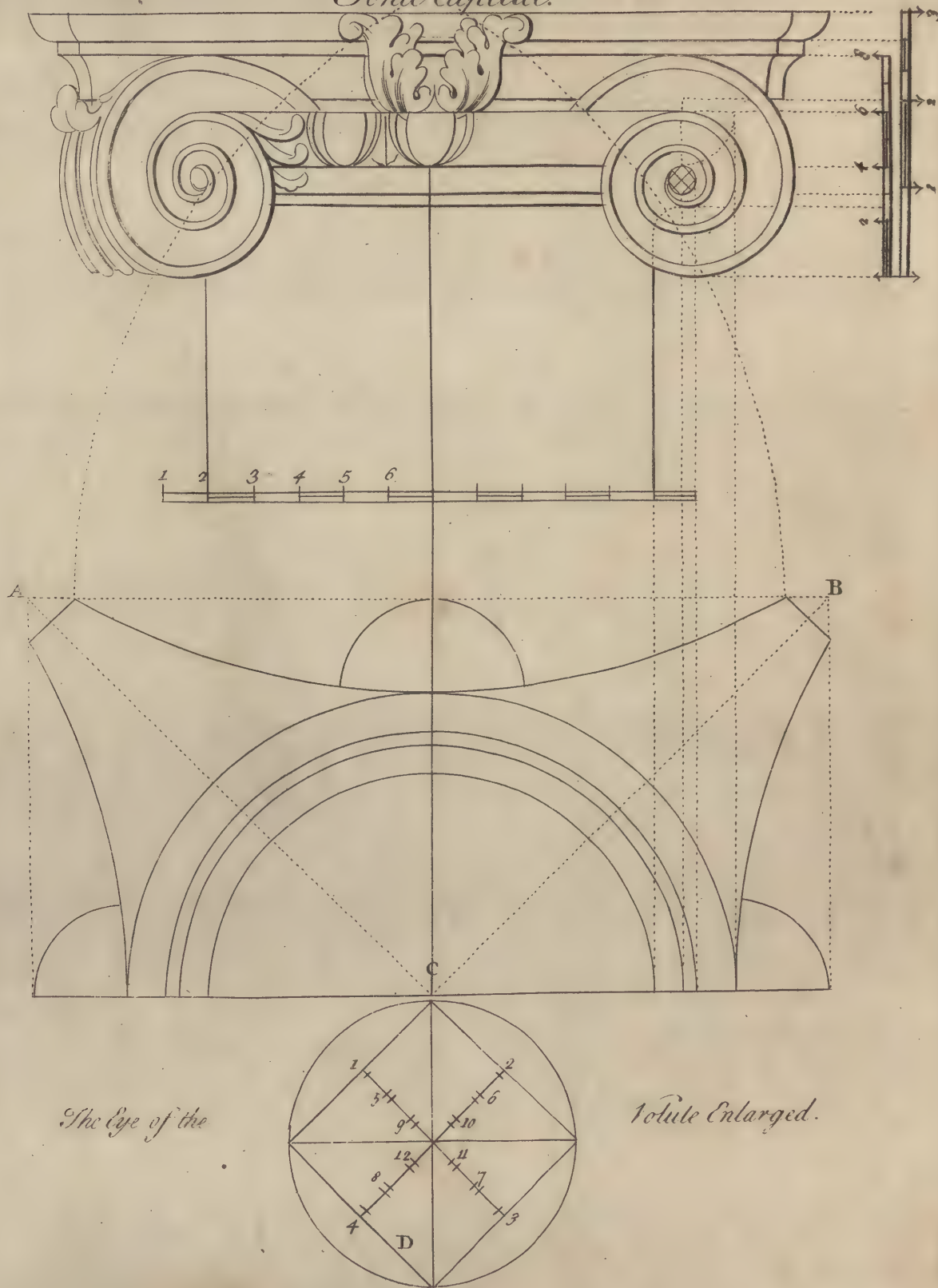
The Height of the Base of the Column is divided into three Parts, one being for the Plinth, and the other two are divided as in the *Doric* Order. The Bead above the upper Torus is part of the Column, and is double the Height of the Fillets, and the Fillet above the said Bead is equal to the others. The Projection likewise is the very same as the *Doric*.

When these Columns are fluted, they must have twenty-four in Number, and they are a Semicircle in Depth, and the List, or Fillet, between each, are one-third of the said Flutes, as by the Plan of one quarter of the Column very plainly appears.

The



Ionio Capital.



The Eye of the

Volute Enlarged.

The Capital of this Order being more difficult than the former, the next Plate is reserved intirely for that Purpose.

The IONIC Capital. Plate IX.

The whole Height is half a Diameter, and being first divided into three, the upper Part is for the Abacus, which is divided again into three, one being allotted for the upper Part, half a Part for the Fillet, and one and an half for the lower Part: From the Middle of the said Abacus downwards is divided into eight Parts, allowing two and an half from the Bottom to the Volute to the Fillet, half a Part to the Fillet, one to the Astragal, and two to the Ovolo; the rest as before limited.

This Column is diminished one-sixth of the Diameter, and the Astragal projects equal to the Body of the Column below: The Ovolo projects equal to its Height. To find the Plan of this Capital, makes a Square from A to B, equal to one Diameter and an half, and draw the Diagonals, and from the Center C, on the said Diagonals, set off a Diameter each way, and draw the Cants at Right-Angles with the said Diagonals; then, for the Curve of the Abacus, make an Equilateral Triangle (the Part of the Square cut off by the Cants being the Base) and the opposite Angle is the Center for the said Curve. The Flower is as high as the Abacus and Fillet, and projects to the Side of the above-mentioned Square. In order to form the Volute, describe a Circle on the Center of the Astragal, equal to its Height, and make the particular Centers as illustrated at large at the Bottom of the Plate, at D; then fixing one Foot of the Compass in the Center marked 1. extend the other to the Top of the Rim, and describe a quarter of a Circle; then

remove the Compasses to the Center 2 : Describe another Quadrate ; and thus, by proceeding to all the rest, in proper Order, you will form the outer Line of the Scroll ; but, for the Diminution of the Rim, each Distance between the Centers is divided into five, and the Part next to the old Center is a new one for the said Diminution.

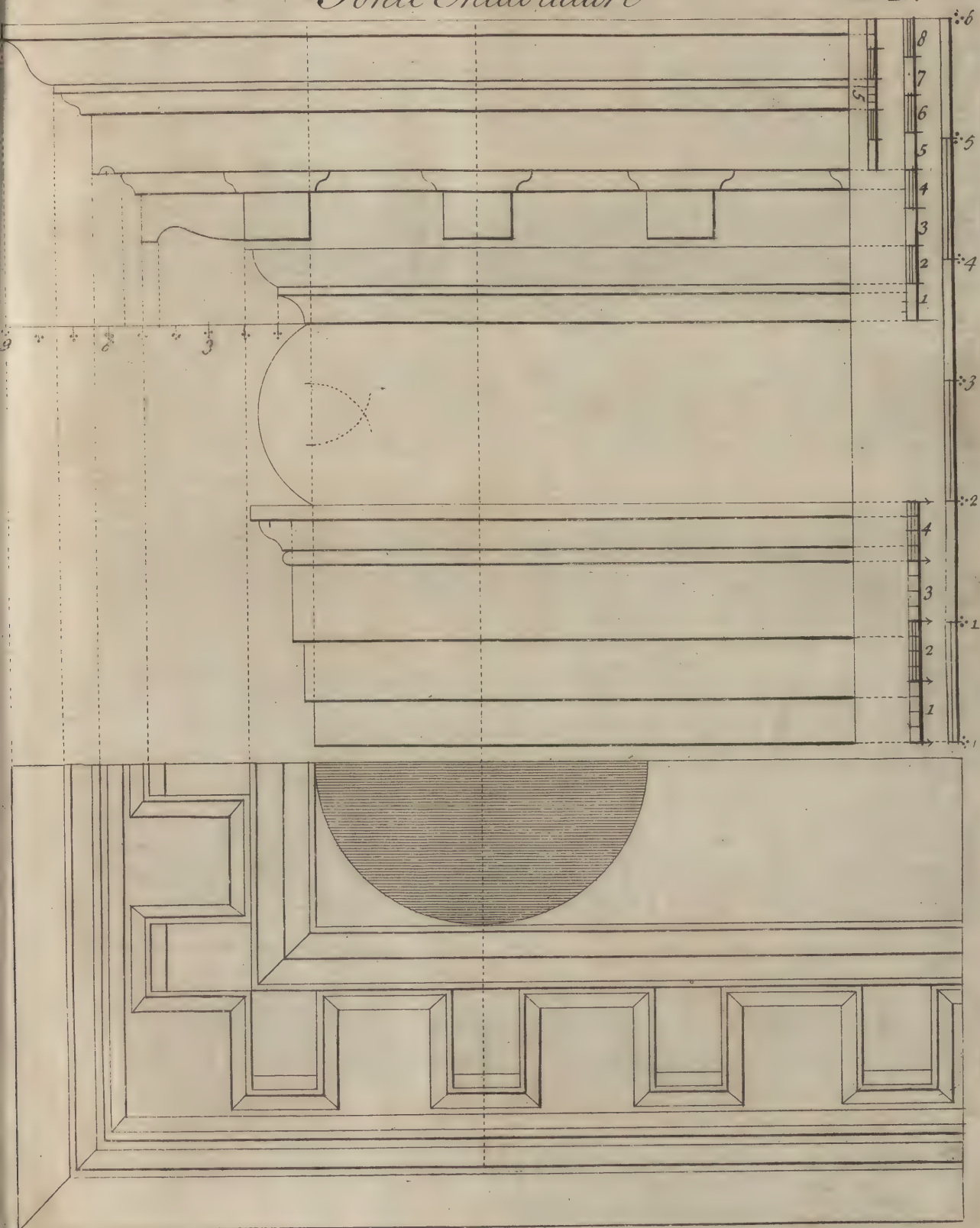
The IONIC Entablature. Plate X.

The whole Height of the Entablature is divided into six Parts (as before-mentioned) allowing two to the Architrave, one and an half to the Freeze, and two and an half to the Cornice ; as for the particular Members, the Architrave being divided into two Parts, each is subdivided into eight (*viz.*) in all sixteen, allowing three to the first Face, four to the second, five to the third, one to the Bead, two to the Ogee, and one to the Fillet : The Projection is one-fourth of the Height, and the upper Face hath one-third thereof. The Freeze is formed by making a Triangle on the middle Part of three in its Height, whose opposite Angle is the Center for the Curve, or Swelling.

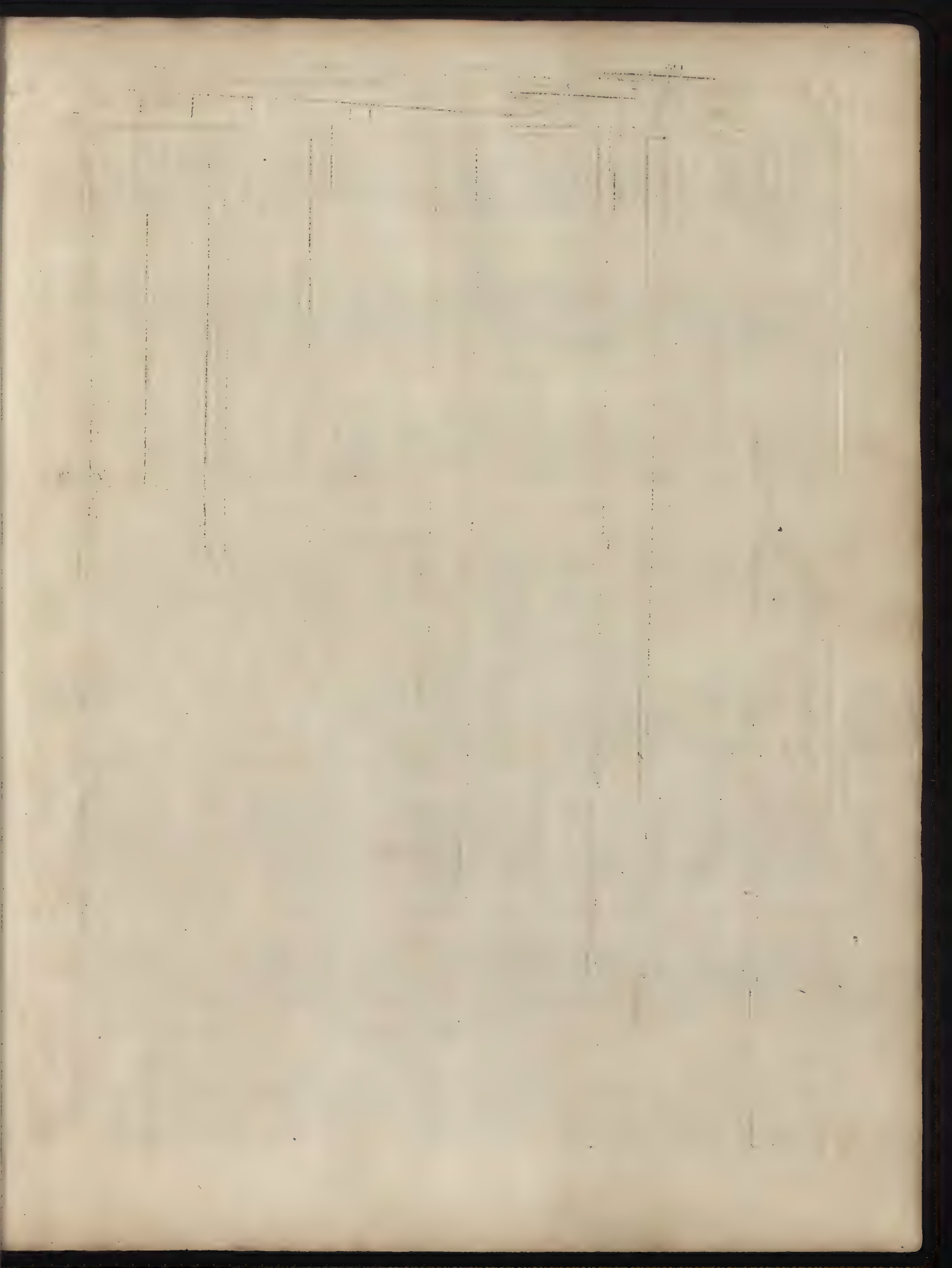
The Height of the Cornice is divided into eight Parts, allowing one to the Hollow and Fillet (which is one-fourth) another to the Ovolo, and two more to the Modillion and Cap (which is half a Part) the upper four Parts must be subdivided into five, giving two to the Corona, one to the Scima Reversa and Fillet (which is one-fourth) one and an half to the Scima Recta, and half a Part to the Fillet. The whole Projection is equal to the Height, and is divided into nine Parts (each being one-twelfth of the Diameter) and as to the several Members,
by

Ionic Entablature

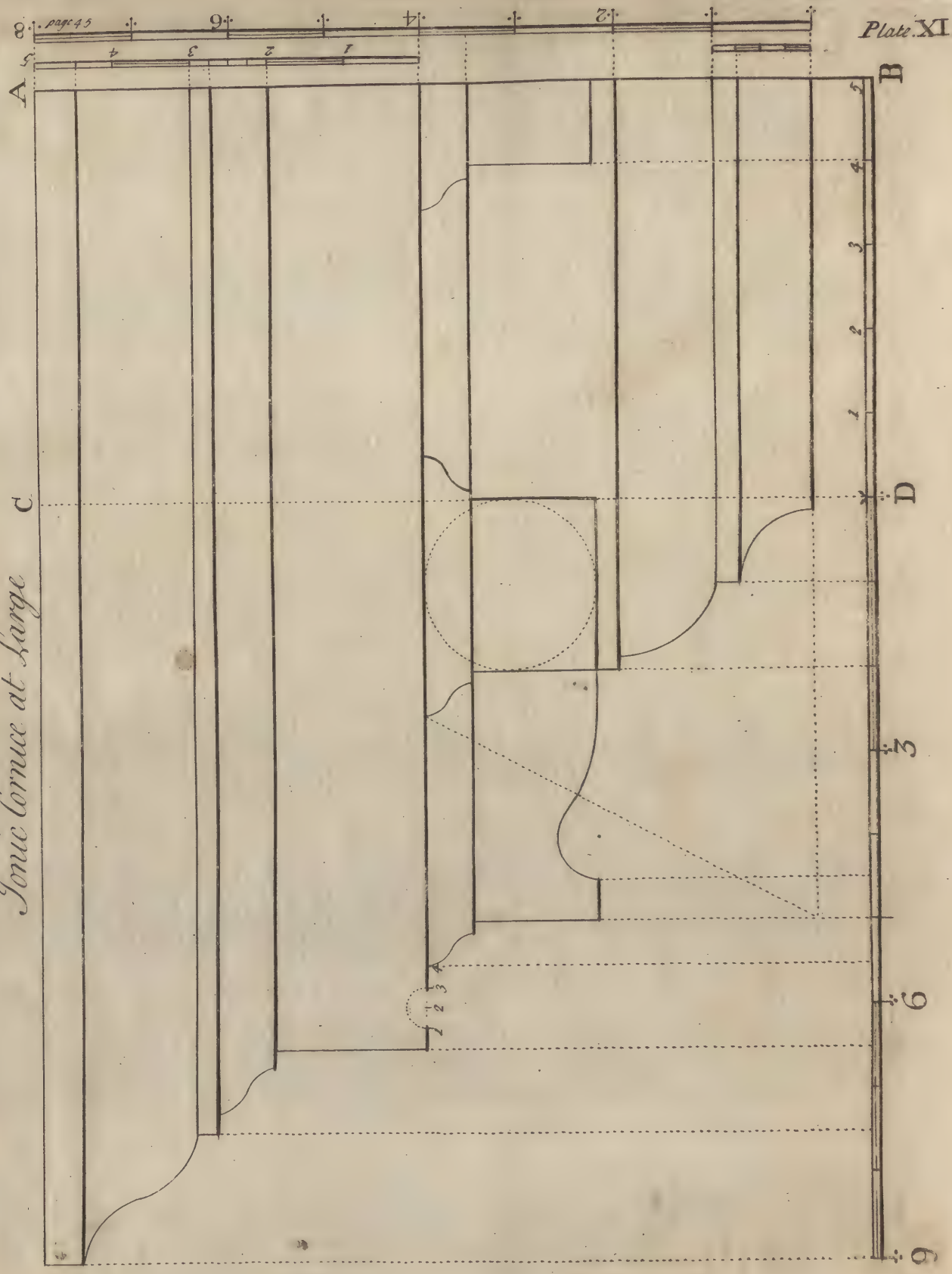
Plate .X.







Tonic Cornice at Large



by a due Inspection of the Plate, and seeing the Cornice in large, they will be easily understood.

On this Plate is likewise illustrated the Plan of the Entablature, by which the Modillions, &c. are explained.

The IONIC Cornice Enlarged. . Plate XI.

The original Divisions are preserved likewise in this Cornice; but as the Modillions render the Understanding of them more difficult, this Plate must be considered with more than ordinary Attention. The Height and Projections are set off as before illustrated; but it is to be further observed, that since, in this Cornice, the whole Projection is divided into nine Parts, the Modillions have two of them in Front, three in Projection, and four for the Interval, or Space, betwixt each Modillion.

The Central Line likewise, of the Column A B, is from the Upright of the diminished Part of the Column C D (which touches the Inside of a Modillion) the Distance of five of these Parts.

Note further; That the Height of the Front Modillion, including the Cap, is equal to its Breadth, as appears by the Circle thereon.

As to the Formation of the Modillion, it is done by three Centers, as appears by Inspection.

The



The Principal Parts of the CORINTHIAN ORDER. Plate I.

A Height being given for this Order, divide it into ten Parts, giving two to the Pedestal, and the other eight Parts divide into six, give five to the Length of the Column with Base and Capital, and the other is for the Height of the Entablature. The Length of the Column must then be divided into nineteen Parts, and two of them will be the Diameter of the said Column, from whence several of the minuter Parts are formed.

The Height of the Entablature is divided into six Parts, giving two to the Architrave, one and an half to the Freeze, and two and an half to the Cornice.

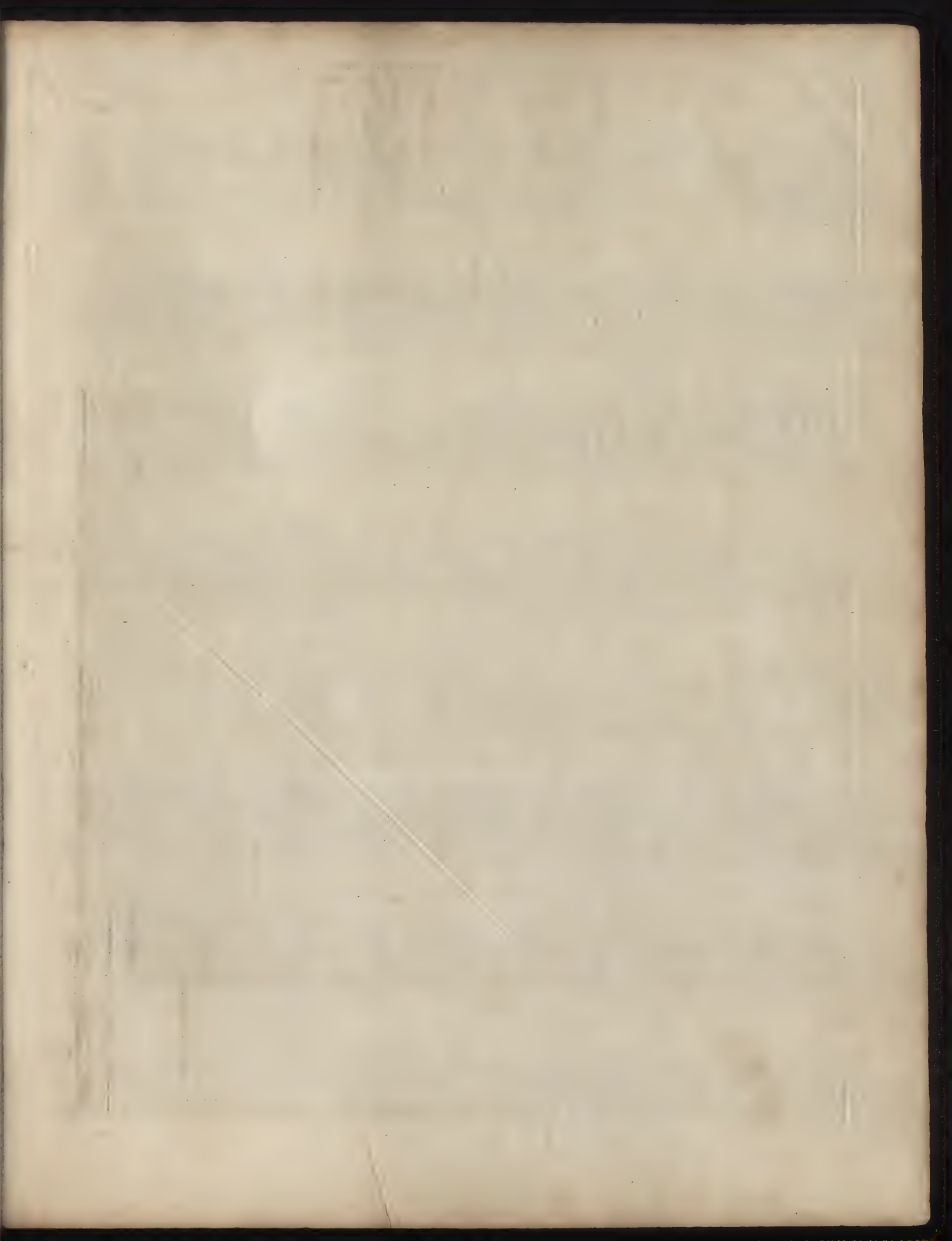
The Architrave projects one-fourth of its Height, and the Cornice equal to its Height.

The Height of the Pedestal is divided into seven Parts, giving two to the Base and Plinth, four to the Dado, and one to the Cap.

The Column is diminished in the same Manner as in the last Order. And if half the Height of the Pedestal be taken, it will give the Projection of the Base of the Column, and the Breadth of the Dado of the Pedestal.

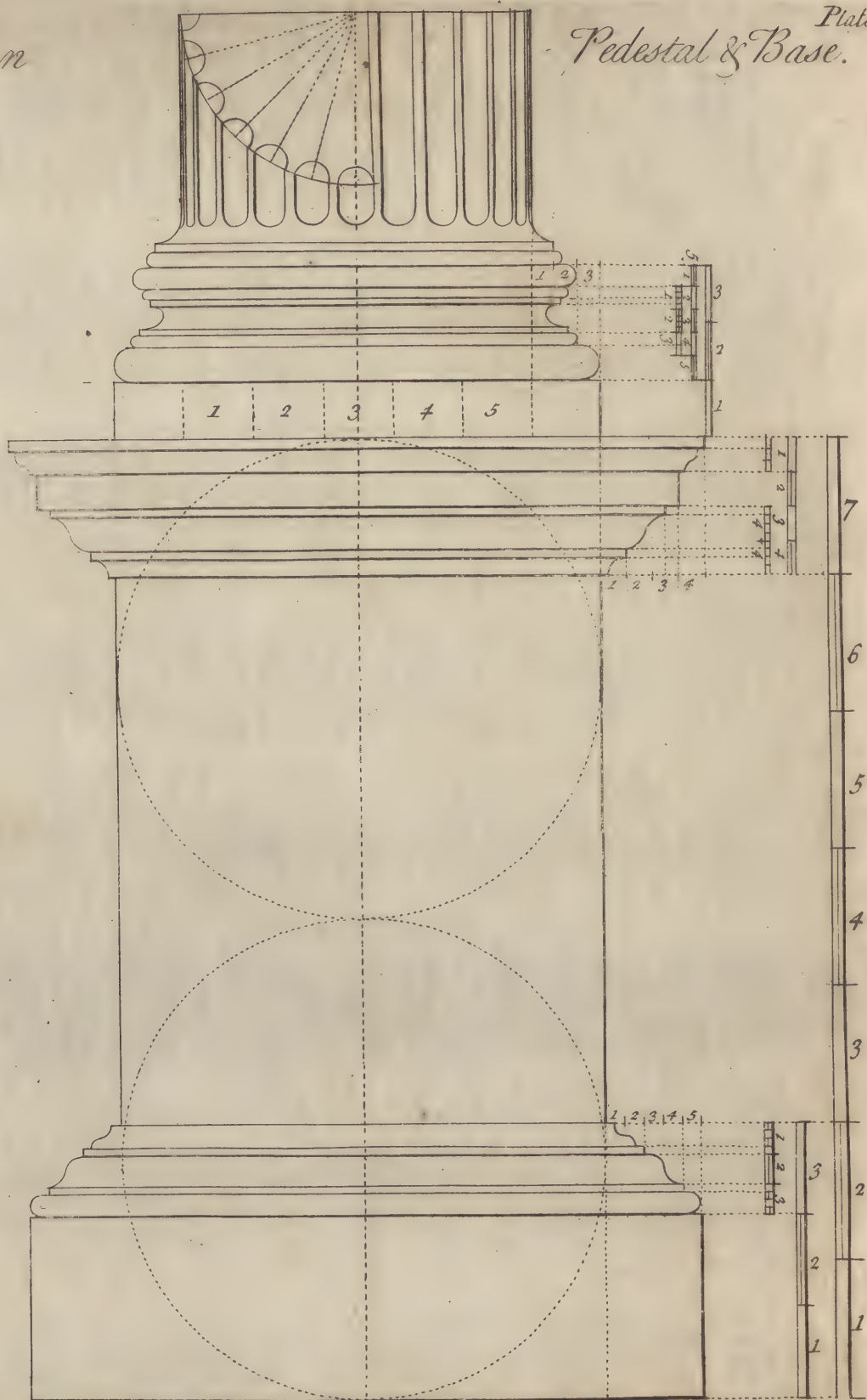
The Base of the Pedestal is one-third of the two Parts allotted for the Base and Plinth, and the Projection thereof equal to the Height, and the Cap three-fourths of the Height.

The



Corinthian

Plate XII
Pedestal & Base.



The CORINTHIAN Pedestal, and part of the Shaft of the Column, and the Base. Plate XII.

The Height of the Base of the Column is half a Diameter, and the Projection of it is found by taking half the Height of the Pedestal, which also is the Breadth of the Dado.

For the particular Members of the Pedestal, divide the Height of the Base into three Parts, giving one to the Torus and Fillet, which is one-fourth, another to the Cymase, and the third to the Ogee and Fillet, which is one-fourth also. The whole Projection is equal to the Height, and being divided into five Parts, give two to the Ogee, two to the Cymase, and the other to the Torus.

The Cap is divided into four Parts, giving half a-part to the Hollow, one-fourth to the Fillet, one to the Cymase, one-fourth to the Fillet, one intire Part to the Corona, and one to the Ogee and Fillet, which is one-third Part thereof; the whole Projection is three Parts of those four in Height, and, being divided into four, is set off by Inspection.

The Height of the Base of the Column is divided into three, giving one to the Plinth; the upper two are again divided into five, giving one and an half to the lower Torus, one to the upper Torus, one to the Scotia, and the other one and an half to the Fillets and Beads, which appear by Inspection (*viz.*) half a Part to each Bead, and one-fourth to each Fillet; the Bead above the upper Torus (being part of the Column) is as large as the Fillet and Bead together, and its Fillet the half thereof, the whole Projection is divided into three Parts, and is comprehended

hended with Ease by inspecting the Plate, and the foregoing Bases.

If these Columns be fluted, they must have the same Number, and be of the same Form as in the last Order.

The Capital being different from the last, on the next Plate is shewn that only.

CORINTHIAN *Capital.* Plate XIII.

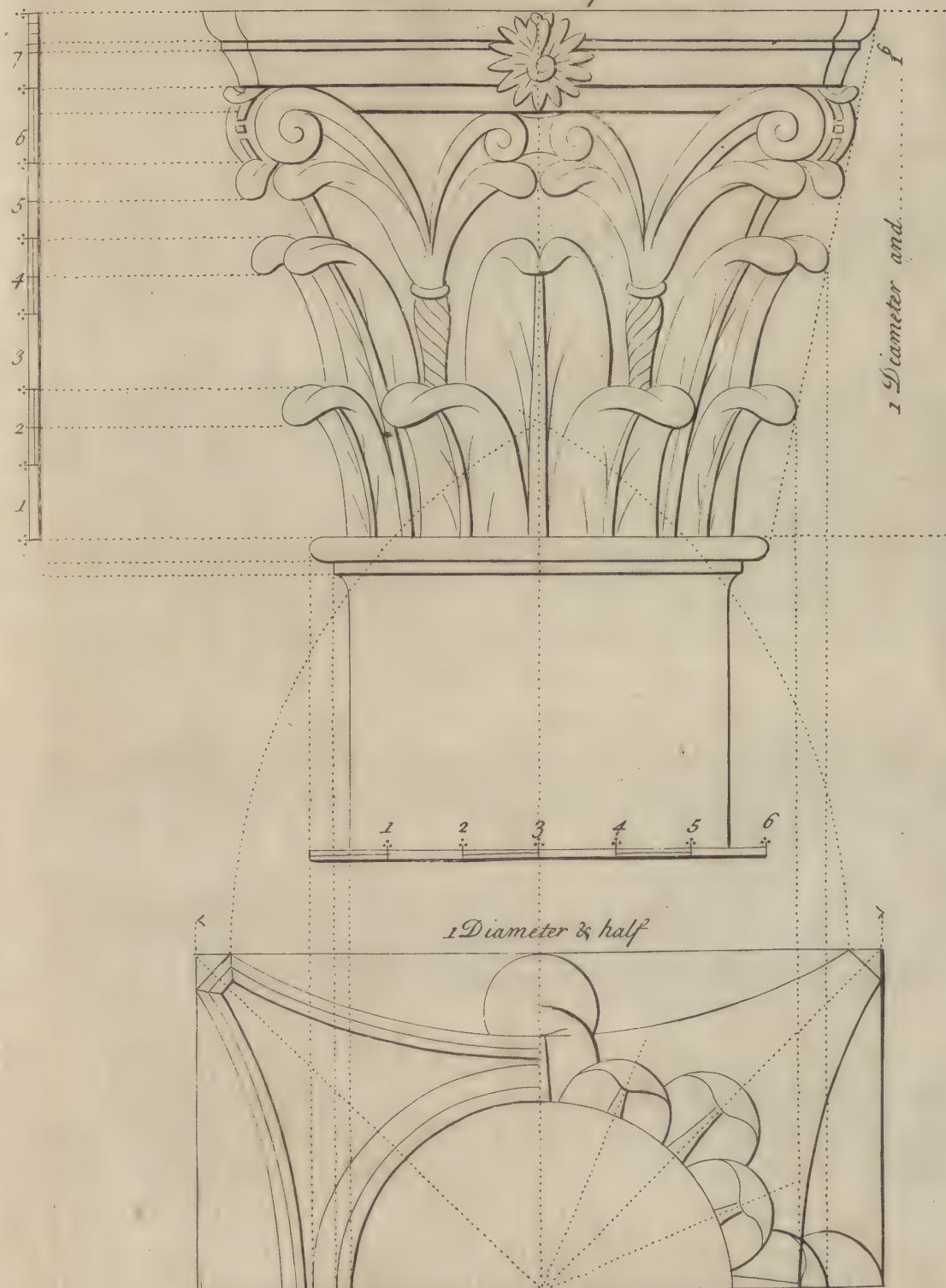
To find the Height, the Diameter of the Column must be divided into six Parts, and one whole Diameter, and one of those Parts is the Height. The said sixth Part is for the Abacus, which being parted into two, give one to the Hollow, and the other to the Ovolo and Fillet, which is one-fourth thereof.

Now the Diameter remaining being already divided into six Parts, each Height of Leaves must have two of these Parts, and their Heads turn down half a Part; as to the upper two Parts, the under one is again divided into two, the Heads of the Leaves turning down one Part, and as to the upper one it must be divided into three Parts, giving one to the Fillet, and two to the small Volutes; the large Volutes have the intire Part; the Rose is as high as the Abacus and the said Fillet together, as plainly appears by inspecting the Plate.

For the Projections, a Geometrical Square must be made of a Diameter and an half, and proceed in all Respects, as taught in the foregoing Order, only observe in the Circumference of the Column, there is eight Leaves in each Height, each Leaf hath four Plants carv'd with Olive, Parsley, &c. according to Fancy.

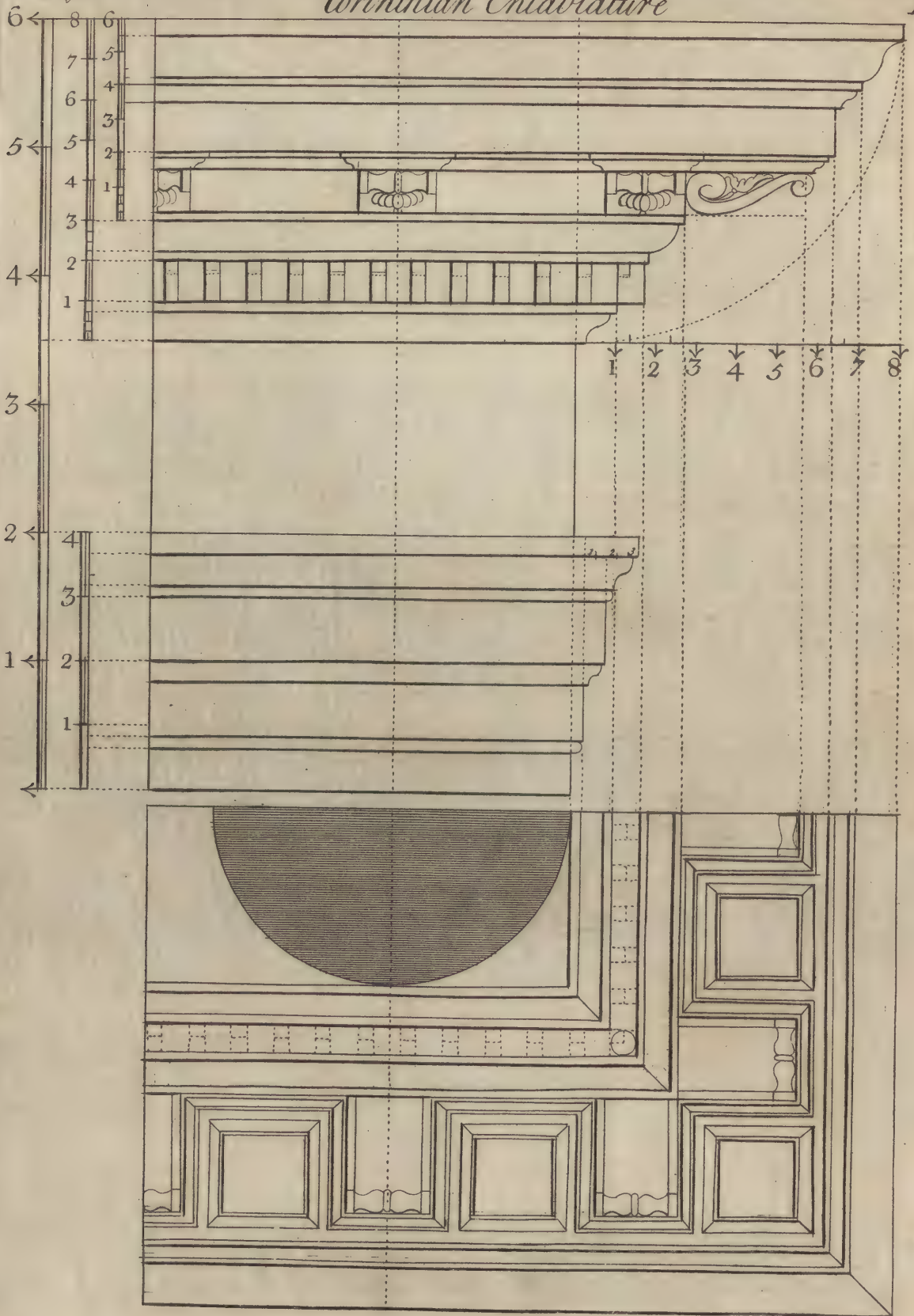
To

Corinthian Capital





Corinthian Entablature



To limit the Projection of their Heads, a Right-Line is drawn from the Projecture of the Abacus to the Collerino, or Astragal, of the Column (whose Proportion was given before in the *Tuscan* Order.

The CORINTHIAN Entablature. Plate XIV.

The whole Height of the Entablature is divided into six Parts (as mentioned before) giving two to the Architrave, one and an half to the Freeze, and one and an half to the Cornice; for the particular Members, the Architrave being in two principal Parts must be divided into four (*i. e.* halve each of them) then the lower Part divide into three, giving two to the lower Face, and half a Part to the Bead; the second Part of the four, also divide into three, giving one to the Ogee; also divide the upper fourth Part into three, giving half a Part to the Bead, one and a half to the Ogee, and one to the upper Fillet; the Projection is one of those fourths in Height, and the middle Face hath half thereof, the rest is easy by inspecting the Architrave at large. Plate XXII.

The Height of the Cornice is divided into eight Parts, giving one to the Ogee and Fillet (which is one-fourth) another to the Dentels, another to the Ovolo and Fillet (which is one-fourth) the other five must be again divided into six, giving one-fourth to the Fillet under the Modillions, one and one-fourth to the Modillion, half a Part to the Ogee and Fillet (which is one-fourth) one and an half to the Corona, half a Part to the Ogee, one-fourth to the Fillet, one and one-fourth to the Scima Recta, and half a Part to the Fillet. The whole Projection is equal to the Height, and being divided into the same

H Number

Number of Parts (*viz.* eight) for the several Members, they are seen by Inspection, especially by seeing the Cornice at large in the next Plate.

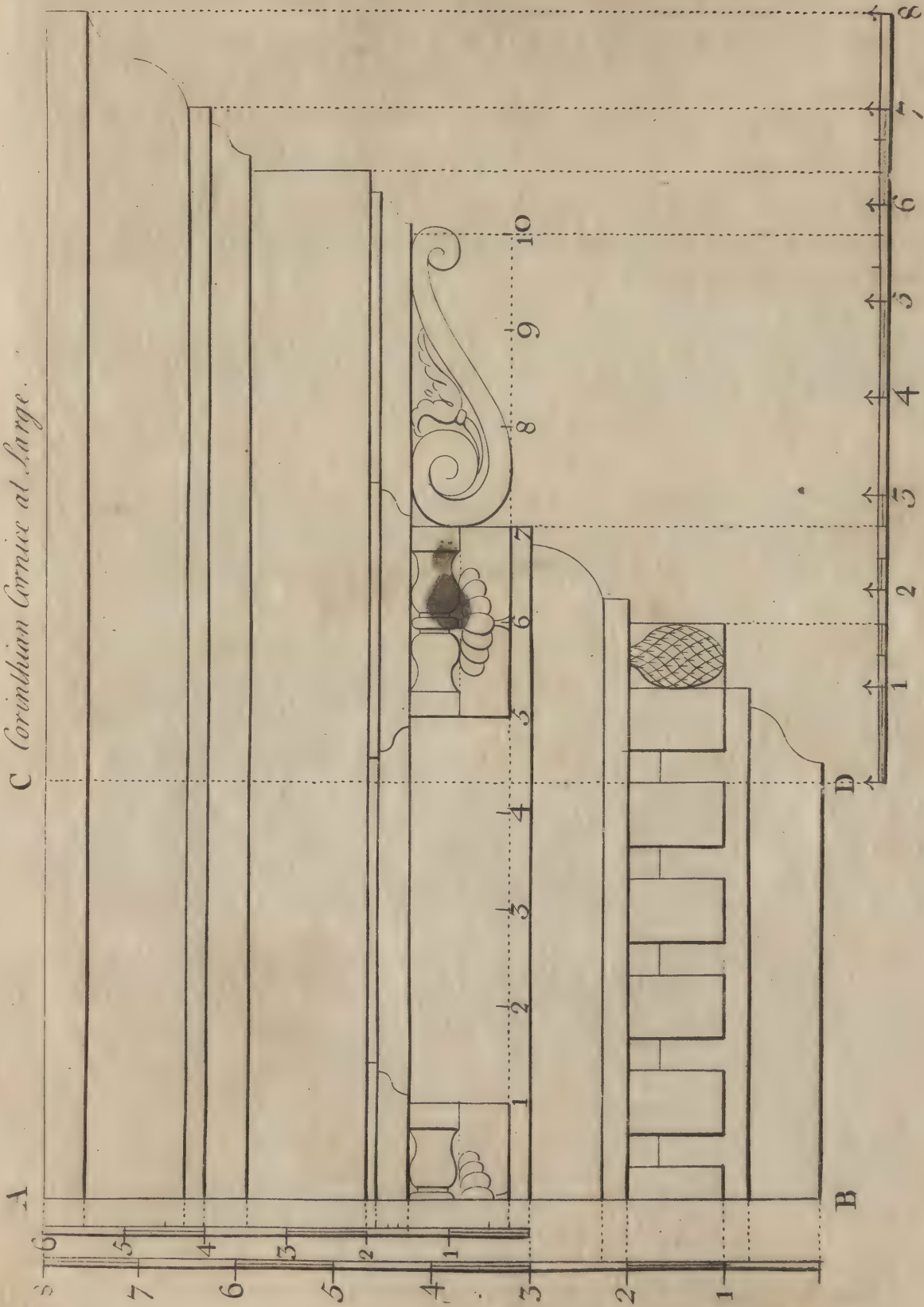
On this Plate is also shewn the Plan of the Entablature, whereby the Construction of the Modillions, Dentels, Coffers, &c. are explained.

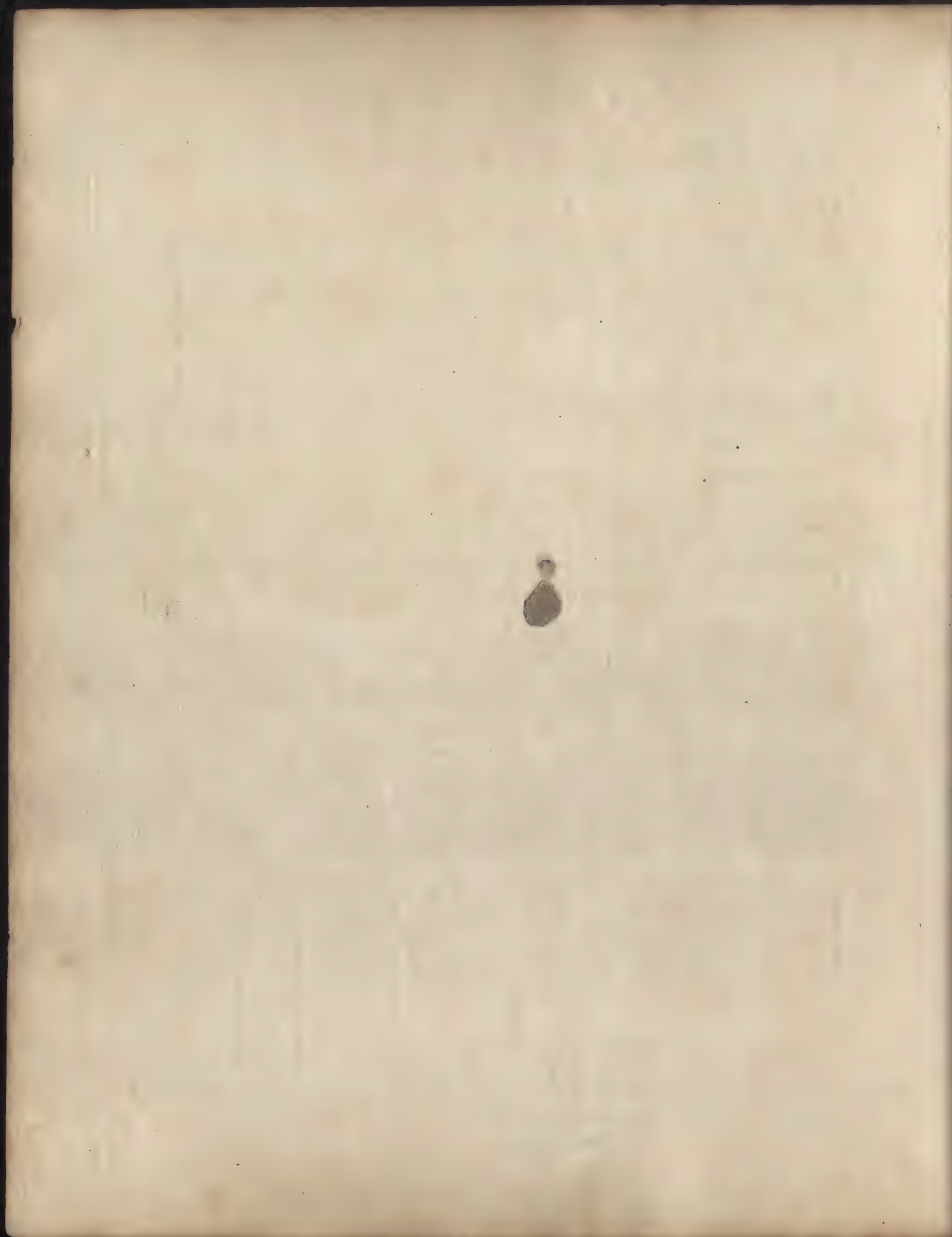
The CORINTHIAN Cornice at large. Plate XV.

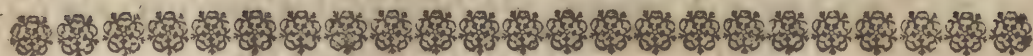
The original Divisions are here preserved, as in the *Ionic*, but the Modillions making the Knowledge thereof more intricate, this Plate must be duly considered. The Height and Projections being done as before taught, observe that some of the Divisions in the Projection are subdivided into three, to set off the Modillion and Dentels, not but (as in the *Ionic*) the Modillions have two of these Parts in Front, three of them in the Projection, and four for the Space between; also the central Line of the Column is A, B, and the diminished Part C, D, and at the Distance of four of these Parts and one-third; also observe, that from the central Line AB, to the End of the returned Modillion, is ten of these Parts, as appears by the Divisions figured above.

The Dentels are two-thirds of one of these Parts both in Breadth and Projection, and one-third for the Space between, which touches the diminished Part C D, and by observing this *Rule*, it will so happen that a Dentel will be under each Modillion. It is usual to put a Pine-apple in the Corner between the two projecting Dentels, and an In-dentel of half the Breadth square between each Dentel.

C Corinthian Cornice at Large.







The Principal Parts of the COMPOSITE ORDER. Plate I.

ANY Height proposed for this intire Order is divided into ten Parts, two thereof being for the Pedestal, the other eight Parts divide into six, and one shall be the Height of the Entablature, and five the Length of the Column with Base and Capital. The said Length is then divided into ten Parts, which is no more than halving each of the five Parts, and that is the Diameter of the Column below; so will the Pedestal be three Diameters, the Column ten, and the Entablature two in Height. The Height of the Entablature is divided into six, giving two to the Architrave, one and an half to the Freeze, and two and an half to the Cornice. The Architrave projects two-sevenths of its Height, and the Cornice equal to its Height.

The Height of the Pedestal is divided into seven Parts, giving two to the Base and Plinth, four to the Dado, and one to the Cap.

The Column is diminished as in the last Order, and the Diameter at Bottom being divided into five, the Base of the Column projects, on each Side, one of these Parts, which gives the Breadth of the Dado of the Pedestal.

The Base of the Pedestal is one-third of the two Parts for the Base and Plinth, and the Projection thereof equal to the Height, and the Cap projects four-fifths of the Height.

The COMPOSITE Pedestal, and part of the Shaft of the Column, and the Base. Plate XVI.

The Height of the Base of the Column is half a Diameter, and the Projection thereof is one-fifth of the whole Diameter, which will limit the Breadth of the Dado of the Pedestal.

For the particular Members of the Pedestal, divide the Height of the Base into four Parts, giving one to the Torus, one-third of a Part to the Fillet, one and two-thirds to the Cymase, and the other Part to the Astragal and Fillet, which is one-third.

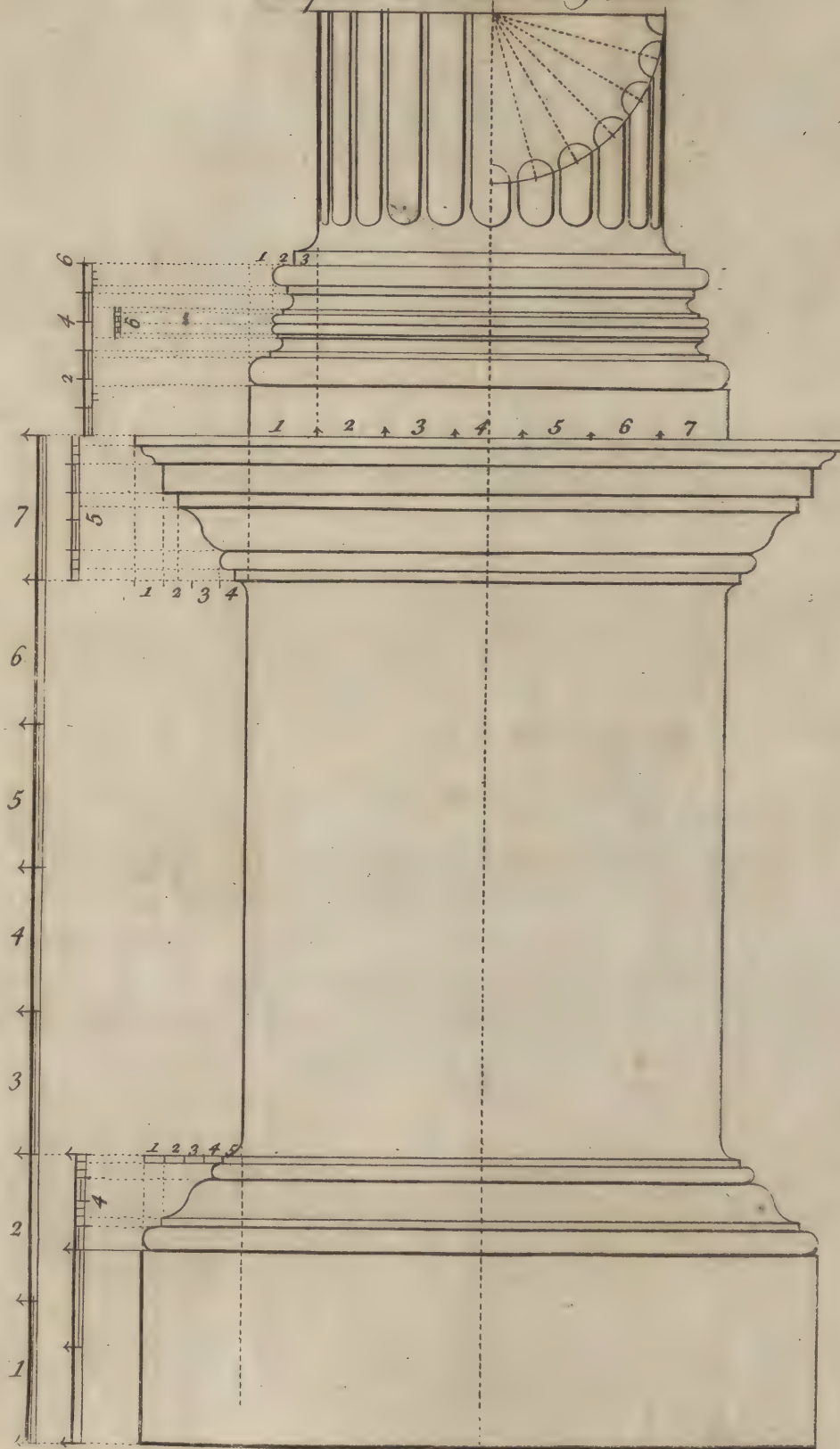
The whole Projection is equal to the Height, and being divided into five Parts is easy set off by Inspection.

The Height of the Cap is divided into five Parts, giving one to the Astragal and Fillet, which is one-third, two more to the Cymase and Fillet, which is half a Part, one to the Corona, and one to the Ogee and Fillet, which is one-third. The whole Projection is four of the said Parts, and cannot be difficult to set off by observing the Plate.

The Height of the Base of the Column is divided into six, giving one and three-fourths to the Plinth, one to the lower Torus, one-fourth to the Fillet, half a Part to the Scotia, one to the Astragals and Fillets (which are again divided into six, each Fillet having one, and each Astragal two) then give half a Part to the other Scotia, one-fourth to the Fillet, and the remaining three-fourths to the upper Torus; as to the Fillet above (which is part of the Column) it is half a Part, or double the Bigness of the under one. The whole Projection is divided

Composite Pedestal & Base

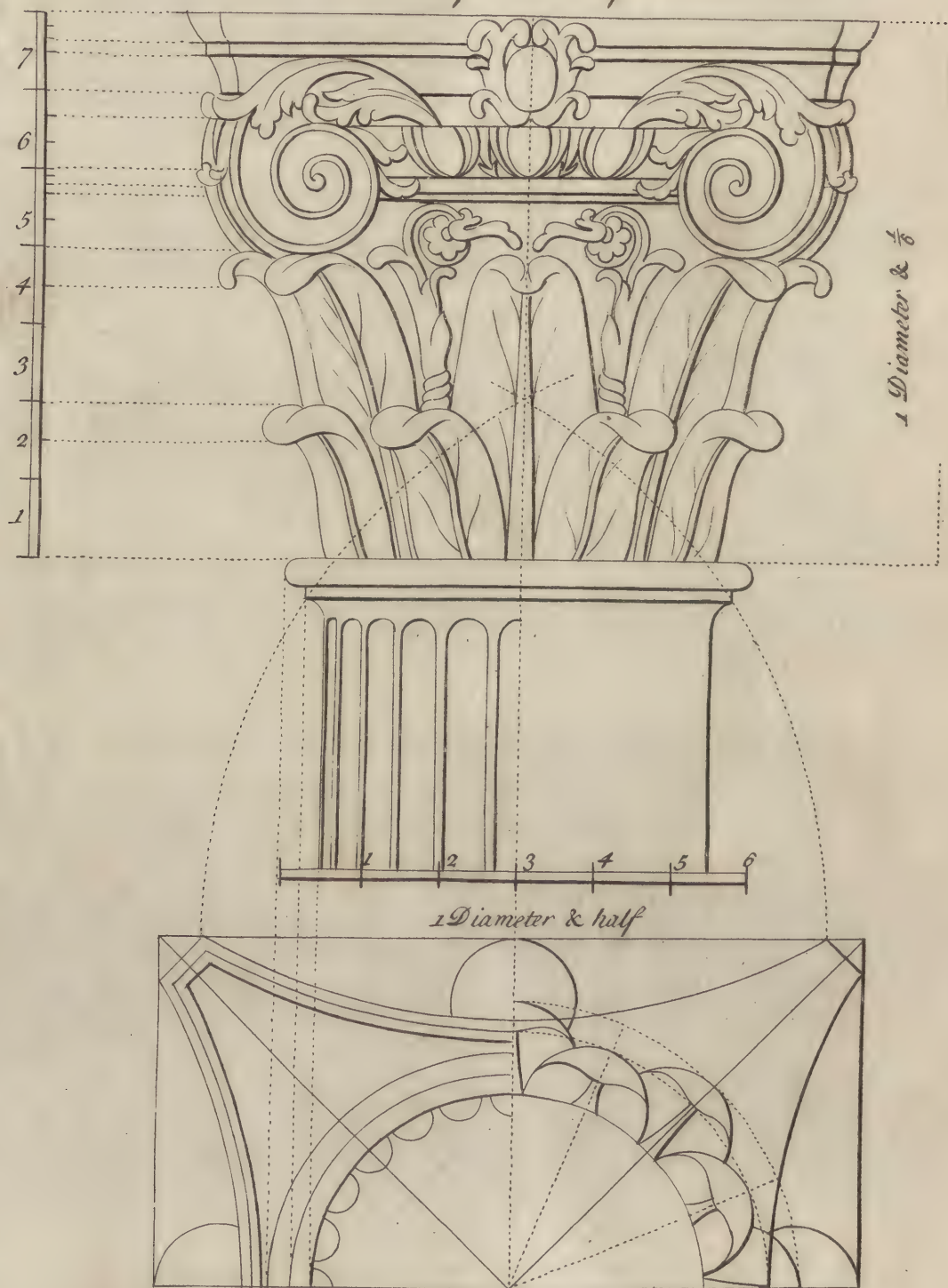
Plate XVI







Composite Capital.



vided into three, and is plainly understood by inspecting the Plates, and the former Rules.

When these Columns are fluted they should have twenty-four in Number, as in the foregoing Orders.

The Capital is also different from the last, therefore is shewn on the next Plate by itself.

COMPOSITE Capital. Plate XVII.

The *Composite Capital* is the same Height as the last Order, viz. one Diameter and one-sixth, and being divided into seven, two are given to each Height of Leaves, the Heads thereof turning down half a Part; then give two-thirds of a Part to the Space between the Leaves and Fillet, one third to the Astragal and Fillet (which is one-third of that) two-thirds more to the Ovolo, one-third to the Space between the Ovolo and Abacus, half a Part to the Hollow, and half a Part to the Ovolo and Fillet, which is one-third thereof. The Projection, and all the other Parts, are the same as the *Corinthian*, except in the Volute, they being made after the same manner as the *Ionic*, and as to the Proportion is easily seen by Inspection.

And it may be further observed, That this Capital is in Height equal to the Architrave and Freeze taken together.

The

The Composite Entablature. Plate XVIII.

The whole Height is divided into six Parts (as mentioned before) giving two to the Architrave, one and an half to the Freeze, and two and an half to the Cornice, for the particular Members. The Architrave is divided into seven Parts, giving two to the first Face, half a part to the Ogee, two and an half to the second Face; the upper two Parts are again divided into five, giving half a Part to the Bead, one and an half to the Ovolo, two to the Hollow, and one to the Fillet; the Projection is two of those seven Parts of Height, and being parted into four, is easy set off by Inspection.

The Freeze is formed after the same Manner as the *Ionic*.

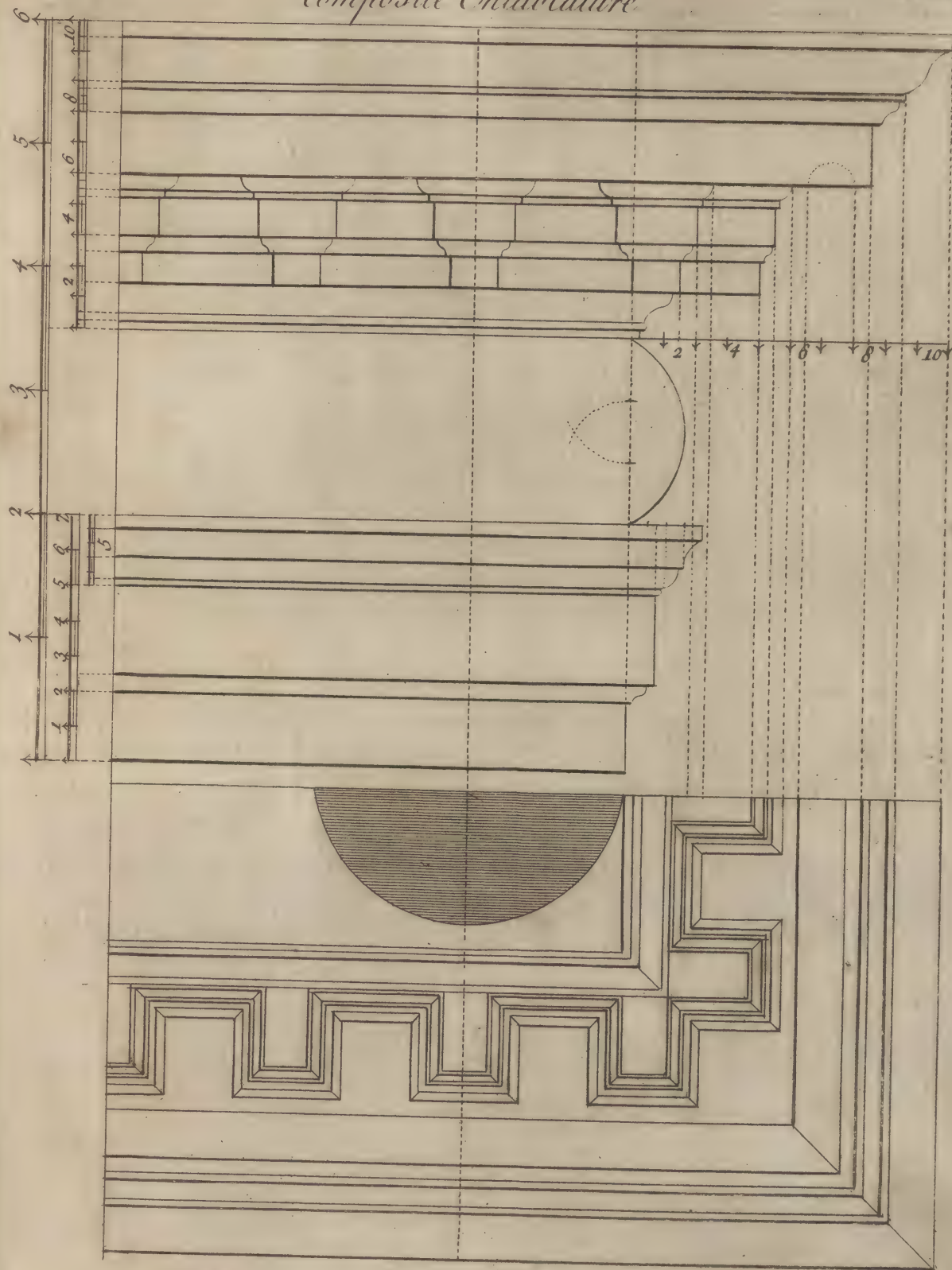
The Height of the Cornice being in two and an half principal Parts, divide each into four, and the half into two, making in the whole ten, give one-fourth to the Fillet, one-fourth to the Bead, and one to the Ogee, one more to the first Face of the Modillions, half a Part to the Ogee, one and one-fourth to the second Face, one-fourth to the Fillet, half a Part to the Ovolo, two to the Corona, one to the Scima Reversa and Fillet, which is one-fourth, and one and an half to the Scima Recta, and half a Part to the Fillet.

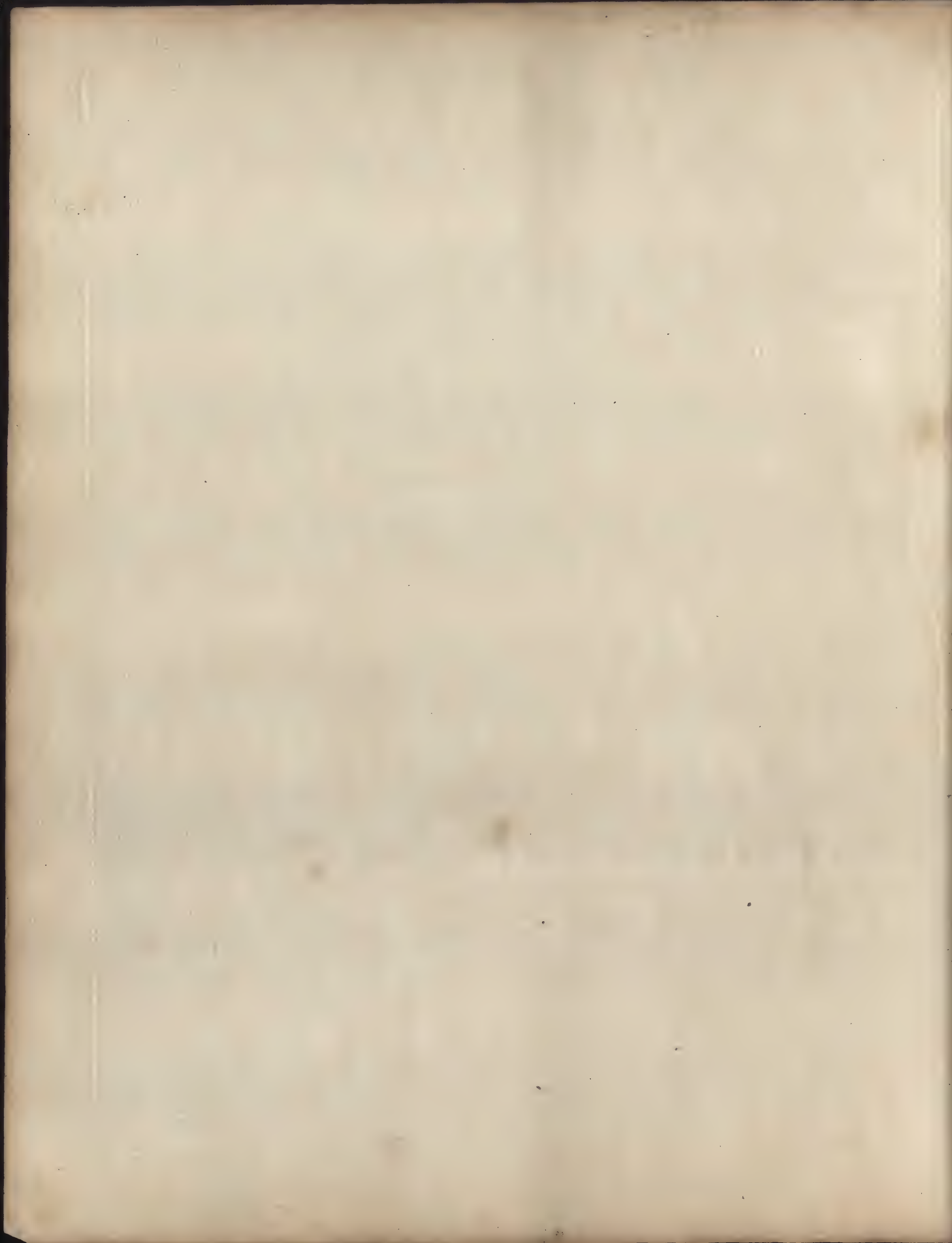
The whole Projection is equal to its Height, and is divided into the same Number of Parts (*viz.* ten) and the several Members and Modillions are seen by Inspection, especially by observing the Cornice at large on the next Plate.

Here is also shewn the Plan of the Entablature, in which the Modillions, &c. are more fully explained.

The

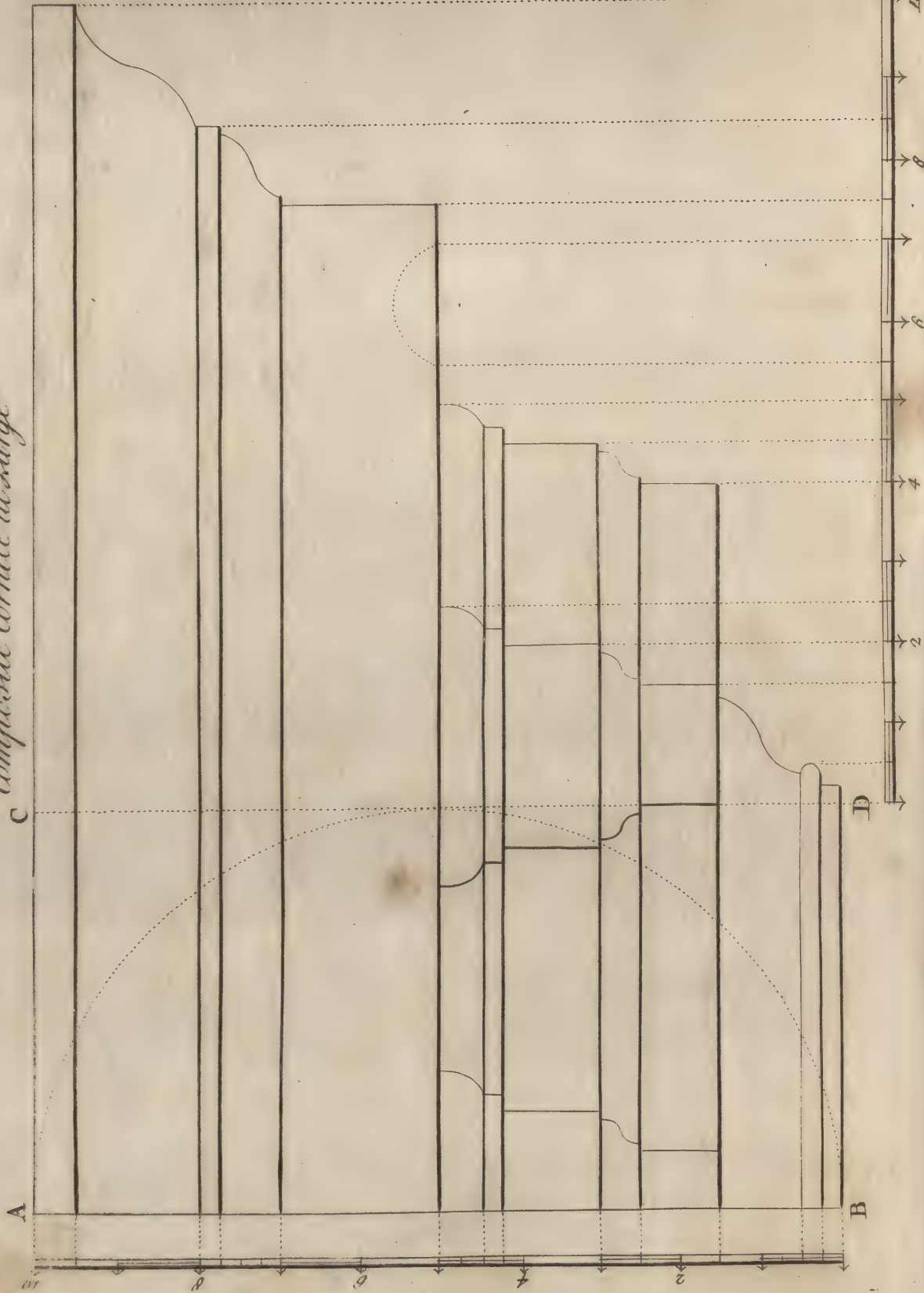
Composite Entablature







Composite Cornice at Large



The Composite Cornice at large. Plate XIX.

The original Divisions are here preserved as before, and observe A B is the central Line of the Column, and C D the diminished Part, or Naked of the Column at Top, and is at the Distance of five of these Parts, or half the Height of the Cornice, as appears by the Semicircle struck on the central Line A B. The Divisions for the Projections being ten, and equal to those of Height; the first Face of Modillions hath one and an half of these Parts, the second Face two (but is two and an half in Breadth, half a part being within the Naked) its Cap half a Part, for the returned Modillion, the first Face four Parts, the second Face four and an half, and the Cap five, the Corona seven and an half, and the Scima Reverfa eight and an half, and placing half a Modillion on each Side the central Line, will give the Space between the Modillions. Also observe this for a *General Rule*, in all the three last Orders, always to have a Modillion in the Center of the Column.

The



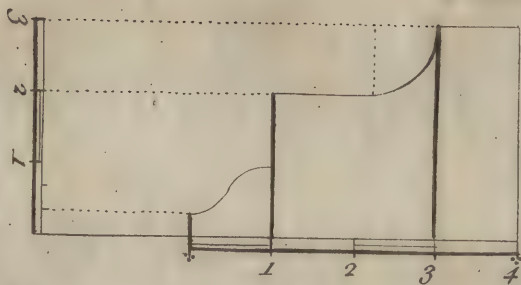
The Caps and Bases to the Pedestals of each respective Order at large. Plate XX.

Observe first, that in all the Bases throughout, they have the same Height and Projection, and that the Caps are half as much again in Height as the Bases, though something more in Projection than the said Bases, except in the *Tuscan*, where they are equal. And that the chief Intent of this Plate is to shew the Divisions at large, where each former Direction is preserved, and the Whole made more easy by a bare Inspection of the several Scales of Height and Projection.

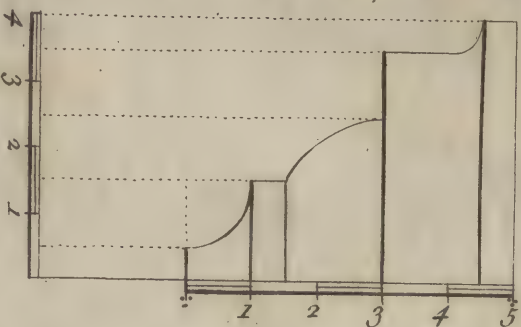
The Bases of the Column belonging to each Order, shewn at large. Plate XXI.

All the Bases are half a Diameter of their Columns in Height, and their Projection one-fifth of the said Diameter. The Mouldings of them are easily formed, being for the most Part Semicircles, except the Scotias, which are made from two Centers, thus; *In the Doric*, Observe the Height being given; divide it into three, and on the Line separating the one above from the two Parts below, and perpendicular to the Fillet, is the Center for the first Quarter of a Circle, and that Distance repeated on the said Line forwards, will be the Center for the other Quarter, and at the same Time limits the Projecture of the lower Fillet; and this Method is continued thro' all the other Orders. As

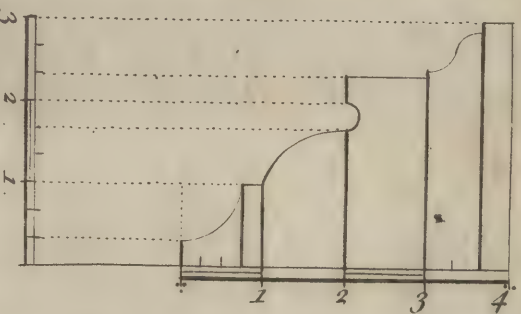
Ionic



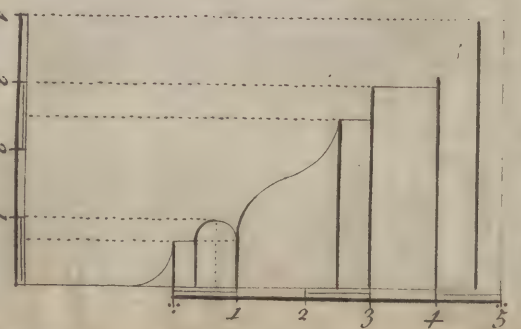
Doric



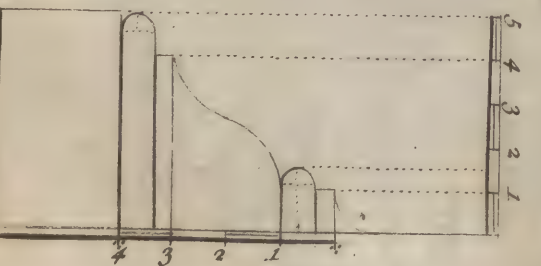
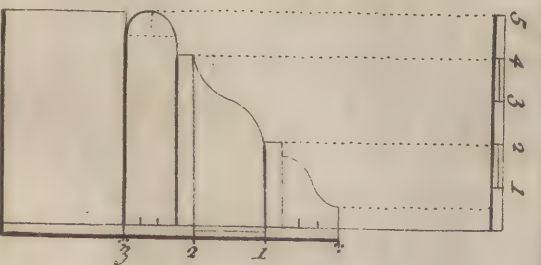
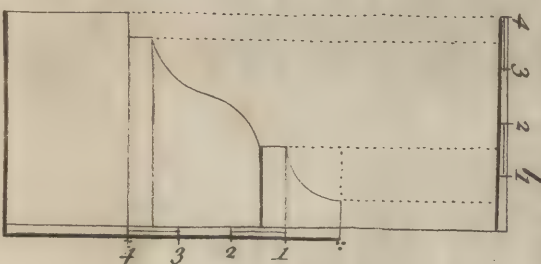
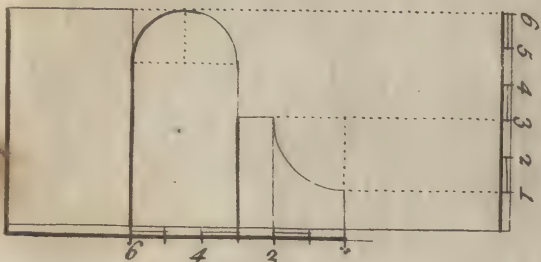
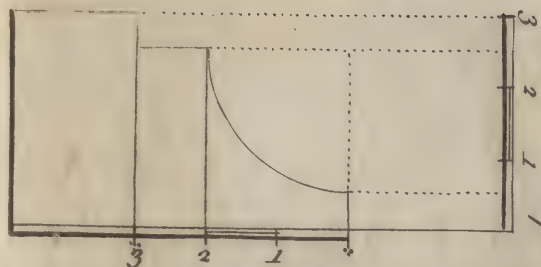
Corinthian

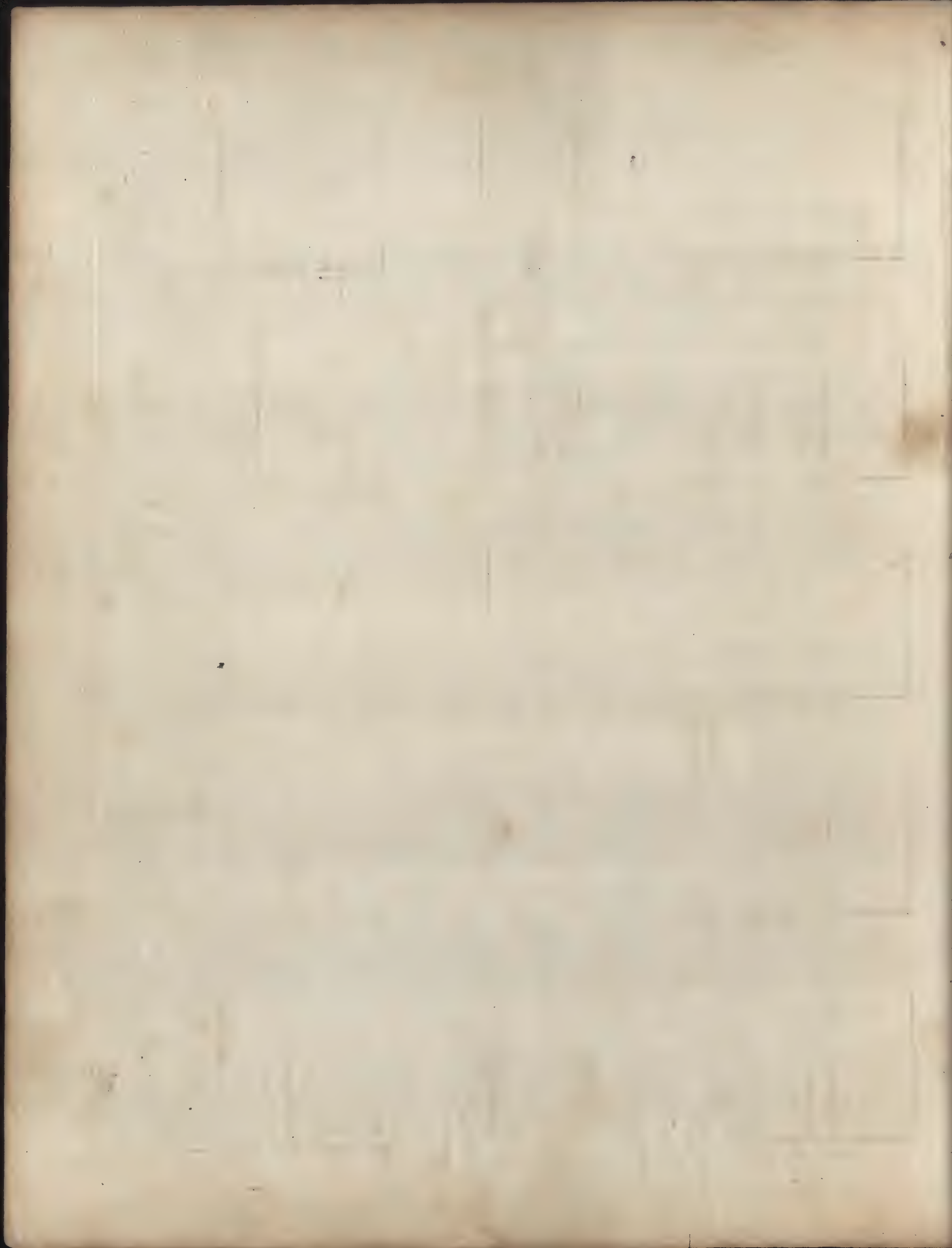


Composite



Capitals & Bases to the Pedestals of each Order at Large.





Bases of the Columns to each Order at Large

50

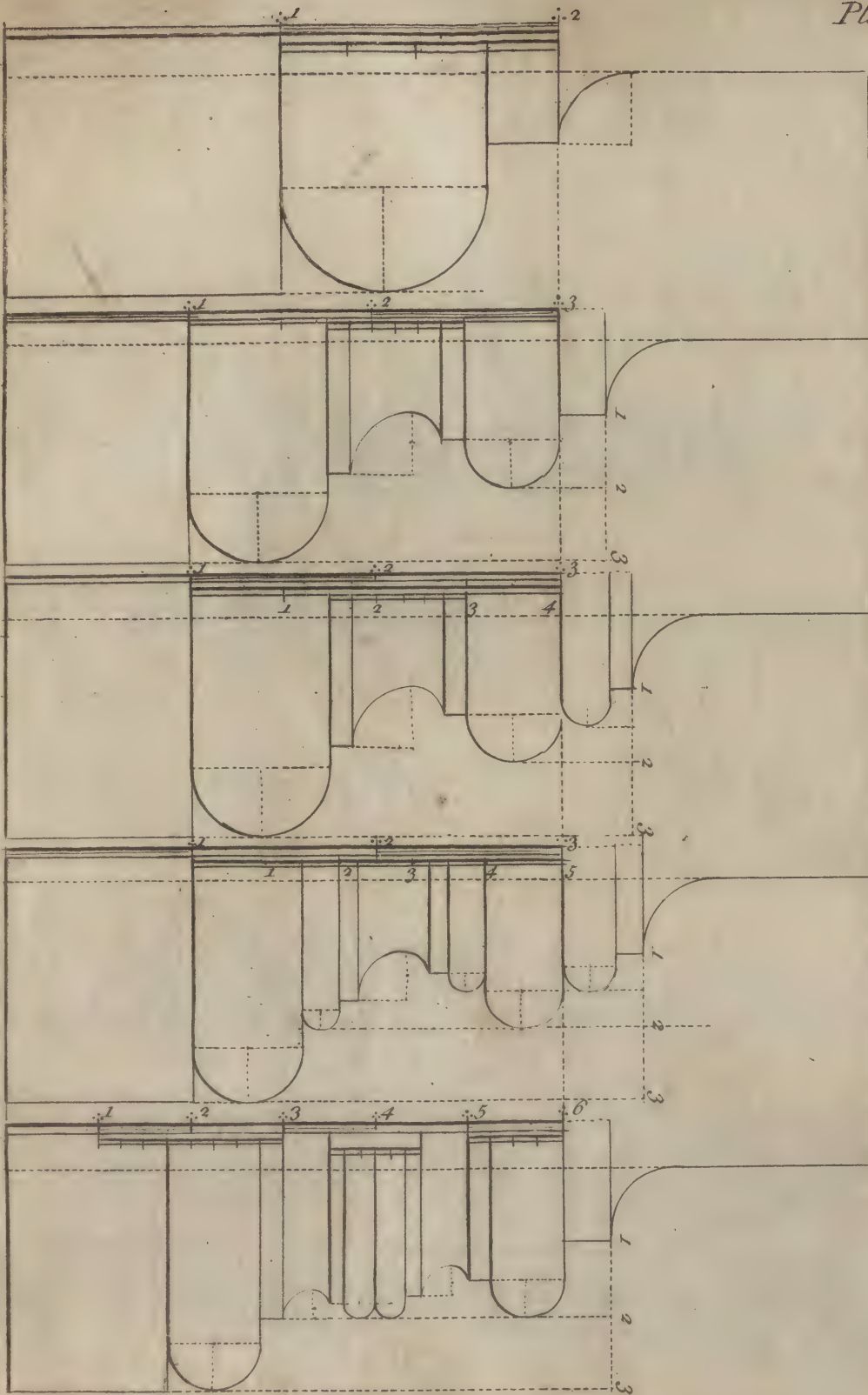
Sturm

Doric

Ionic

Corinthian

Composite





1871

1. The first of the three is a simple line drawing of a building with a gabled roof and a chimney. The second is a more detailed drawing of a building with a gabled roof and a chimney, showing the interior structure. The third is a drawing of a building with a gabled roof and a chimney, showing the exterior structure.

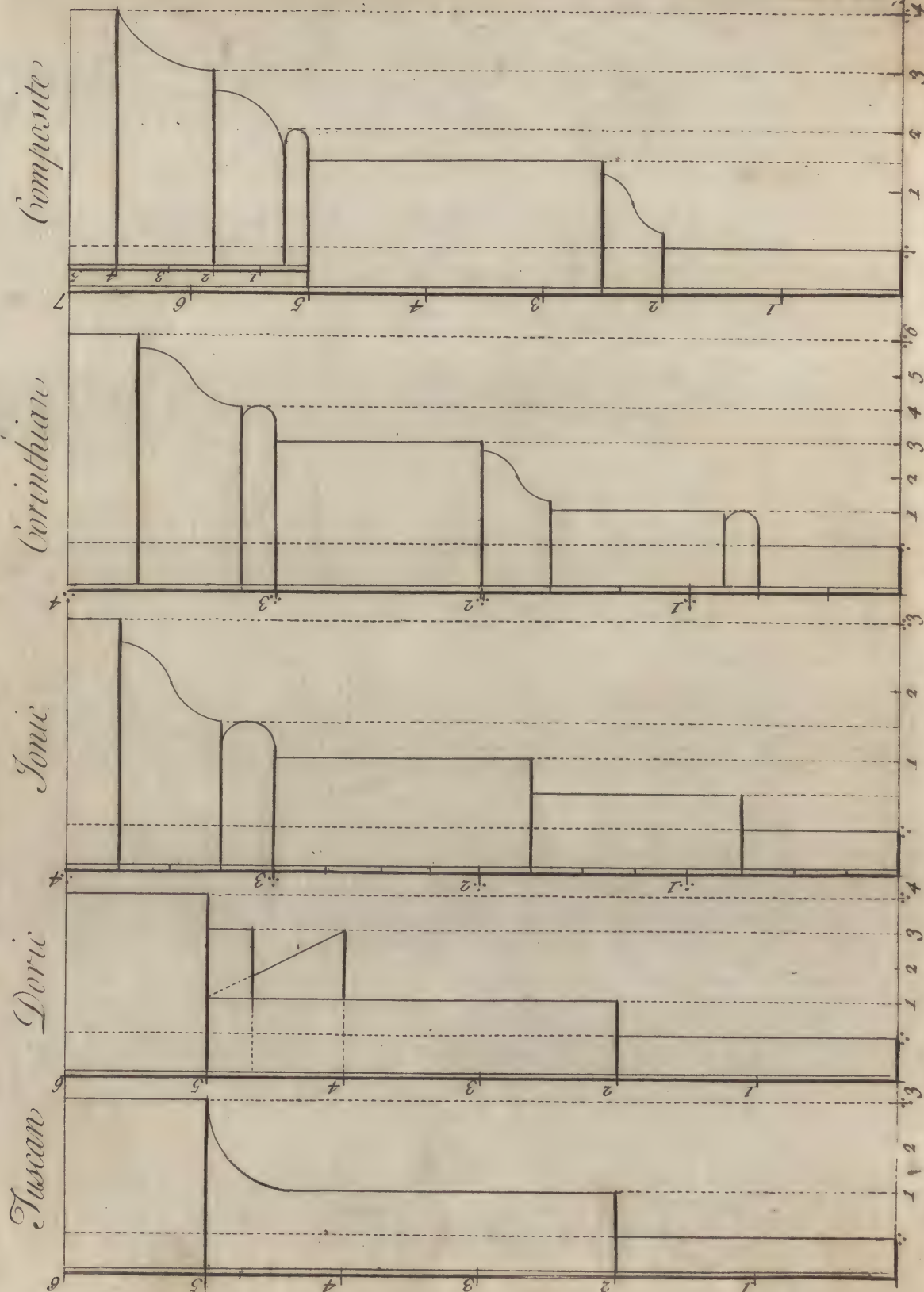
2. The first of the three is a simple line drawing of a building with a gabled roof and a chimney. The second is a more detailed drawing of a building with a gabled roof and a chimney, showing the interior structure. The third is a drawing of a building with a gabled roof and a chimney, showing the exterior structure.

3. The first of the three is a simple line drawing of a building with a gabled roof and a chimney. The second is a more detailed drawing of a building with a gabled roof and a chimney, showing the interior structure. The third is a drawing of a building with a gabled roof and a chimney, showing the exterior structure.

4. The first of the three is a simple line drawing of a building with a gabled roof and a chimney. The second is a more detailed drawing of a building with a gabled roof and a chimney, showing the interior structure. The third is a drawing of a building with a gabled roof and a chimney, showing the exterior structure.

5. The first of the three is a simple line drawing of a building with a gabled roof and a chimney. The second is a more detailed drawing of a building with a gabled roof and a chimney, showing the interior structure. The third is a drawing of a building with a gabled roof and a chimney, showing the exterior structure.

Architraves to each Order at Large



As to the several Heights and Projections, they are plainly shewn by the Perpendicular and Level Scales. On the Sides and Tops.

The Architraves belonging to each Order, shewn at large.
Plate XXII.

Here you will, at one View, see the Height of the two first Orders (*viz.*) *Tuscan* and *Doric*, divided each into six Parts, and then, with some small Sub-divisions in that of the *Doric*, all the Mouldings are set off, as is plain on the Plate.

The next two Orders (*viz.*) *Ionic* and *Corinthian*, are divided each into four Parts, and then subdivided; the Parts in the *Ionic* each into four, and those of the *Corinthian* into three, from whence the several Members are taken.

As to the *Composite*, it is divided into seven Parts, and the upper two subdivided into five, which regulates the Members.

All the Projections are set off from the lower, or first Face, and in the two first Orders is one-sixth of the Height, in the two next one-fourth of the Height, and in the last two-sevenths of the Height; and as for the Particulars, they are plain by the Divisions and dotted Lines.



Imposts of Arches with their Architraves. Plate XXIII.

THESE Imposts are all of them in Height one-eighth Part of the Opening of each respective Arch to which they belong. And this Height will also appear hereafter to be equal to the Breadth of the Pilaster on each Side the Arches.

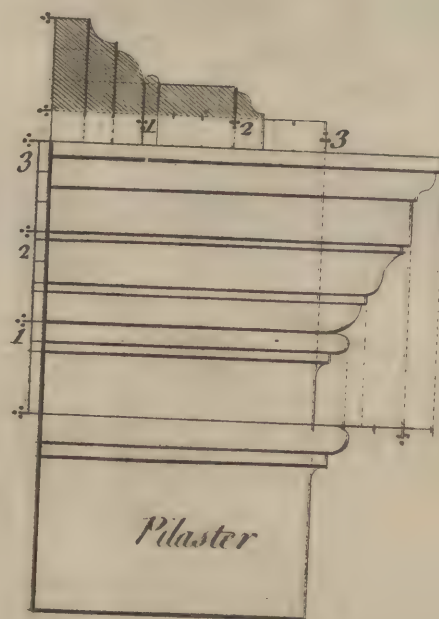
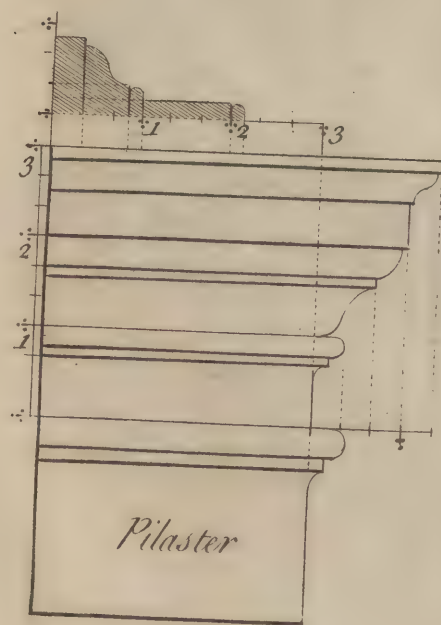
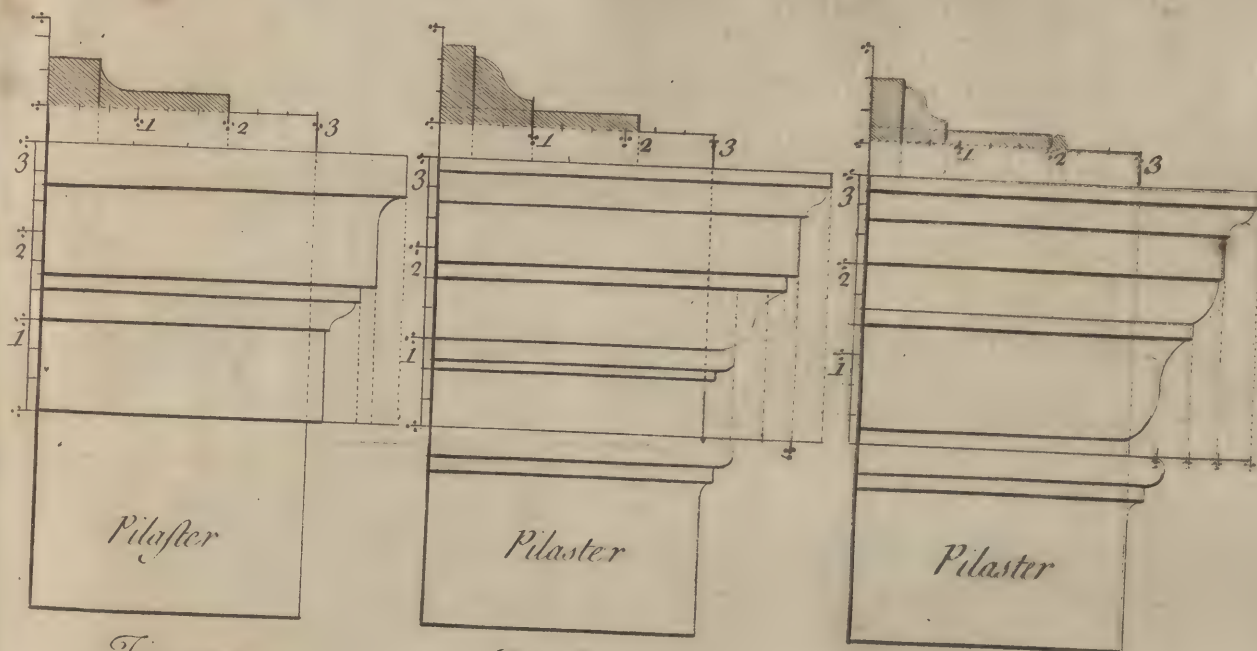
The Height then divide into three principal Parts, and subdivide each into three (*i. e.* nine Parts in the Whole) and, by what has been already shewn, it cannot be difficult to set off the several Members. For the Projections, observe the *Tuscan* has one of the three principal Parts, but the remaining four hath four of the nine Parts of Heights; and as to the several Members, they are seen by Inspection.

The Astragal, at the Foot of them, is one of the nine Parts, and the Fillet half thereof; the Projection of the said Fillet is equal to its Height, and the Whole one and one-fourth of the said Parts.

For the Architraves that circumscribe the Arch, they are formed by the self-same Divisions for the Breadth (which is equal to the Pilaster) and the several Projectures will plainly appear by a due Inspection of the Plate; therefore more said hereon were but Tautology.

Imposts of Arches with their Architraves

Plate XXIII



Corinthian

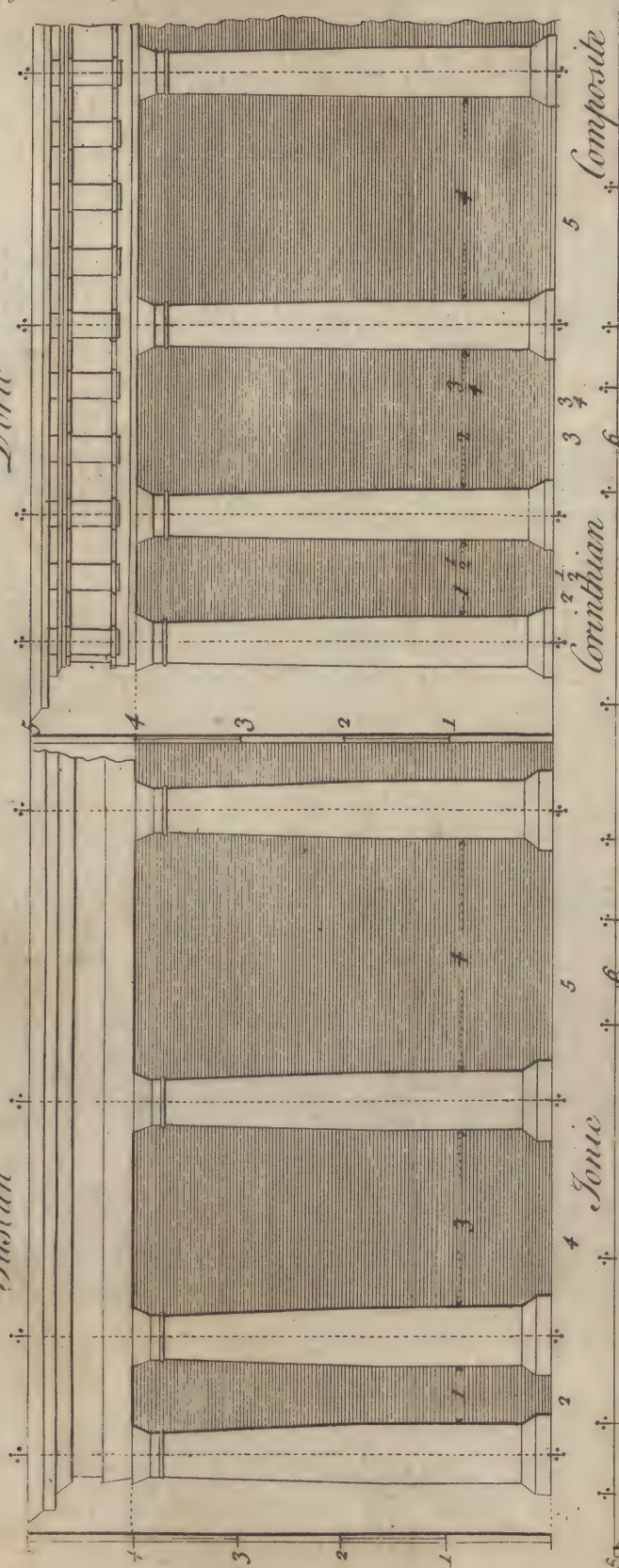
Composite





Tuscan

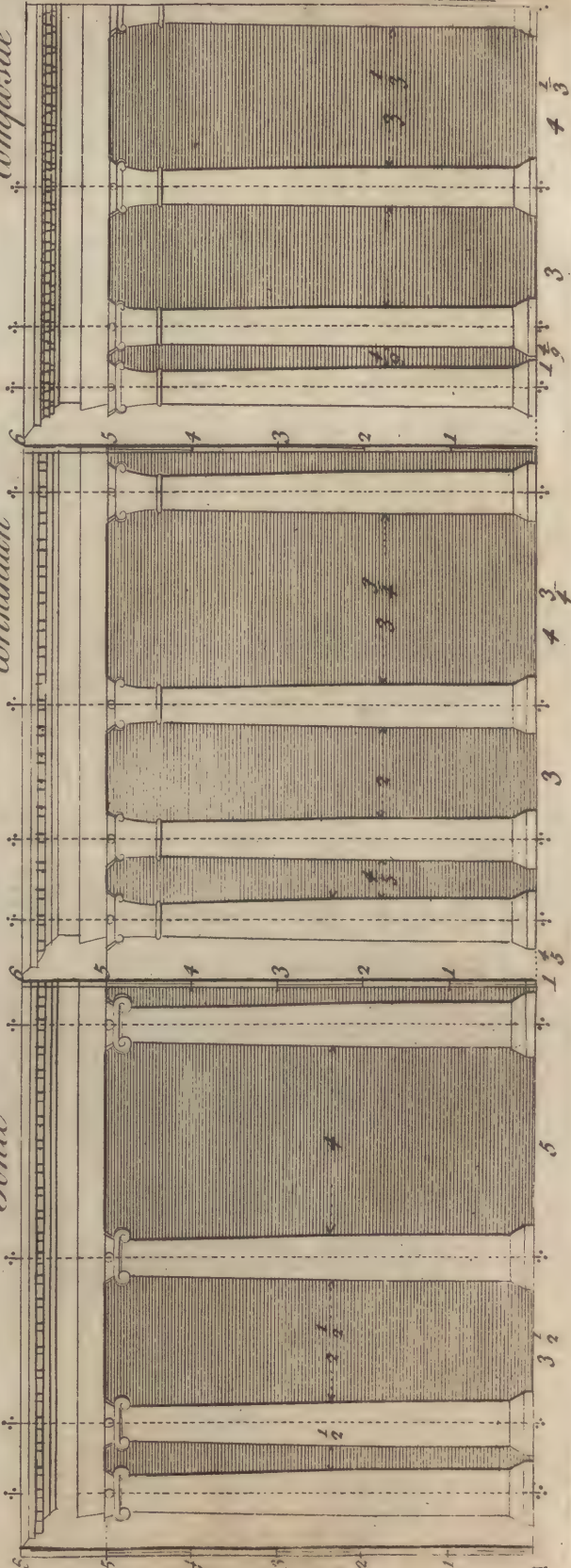
Doric



Ionie

Corinthian

Composite





Of Intercolumnations ; or, the Space that should be observed between the Columns of each Order. Plate XXIV.

IN the *Tuscan* Order no great Regard need be had to the Distance between the Columns ; but in the other four Orders particular Care must be taken to regulate them, according to the Number of Triglyphs intended between (if in the *Doric*) and the Number of Modillions in the other three ; therefore on this Plate is shewn the *Tuscan* Order at one, three and four Diameters Distance : The *Doric*, for one Triglyph between is one Diameter and an half ; for two Triglyphs, two and three-fourths ; and for three Triglyphs, four Diameters.

Also in the other three Orders you will find, that,

In the <i>Ionic</i> Order.	In the <i>Corinthian</i> .	In the <i>Composite</i> .
For 2 Modillions between is $\frac{1}{2}$ a Diameter	2 Modillions $\frac{2}{3}$	2 Modillions $\frac{4}{5}$
For 6 Ditto ————— $2\frac{1}{2}$	4 Ditto ————— 2	6 Ditto ————— $2\frac{1}{3}$
For 9 Ditto ————— 4	7 Ditto ————— $3\frac{1}{4}$	8 Ditto ————— $3\frac{1}{3}$

and here observe, that a Triglyph, or Modillion, must always be strictly over the Middle of a Column, as mentioned before.

The Figures, at the Bottom of each Order, shew the Distance between the central Line of each Column, as the others do the Space between. And *Note*, The smallest Space is never made Use of but in Couplets of Columns (two and two) in which Case the largest Intercolumnation is also used.



The ARCHES of each Order.

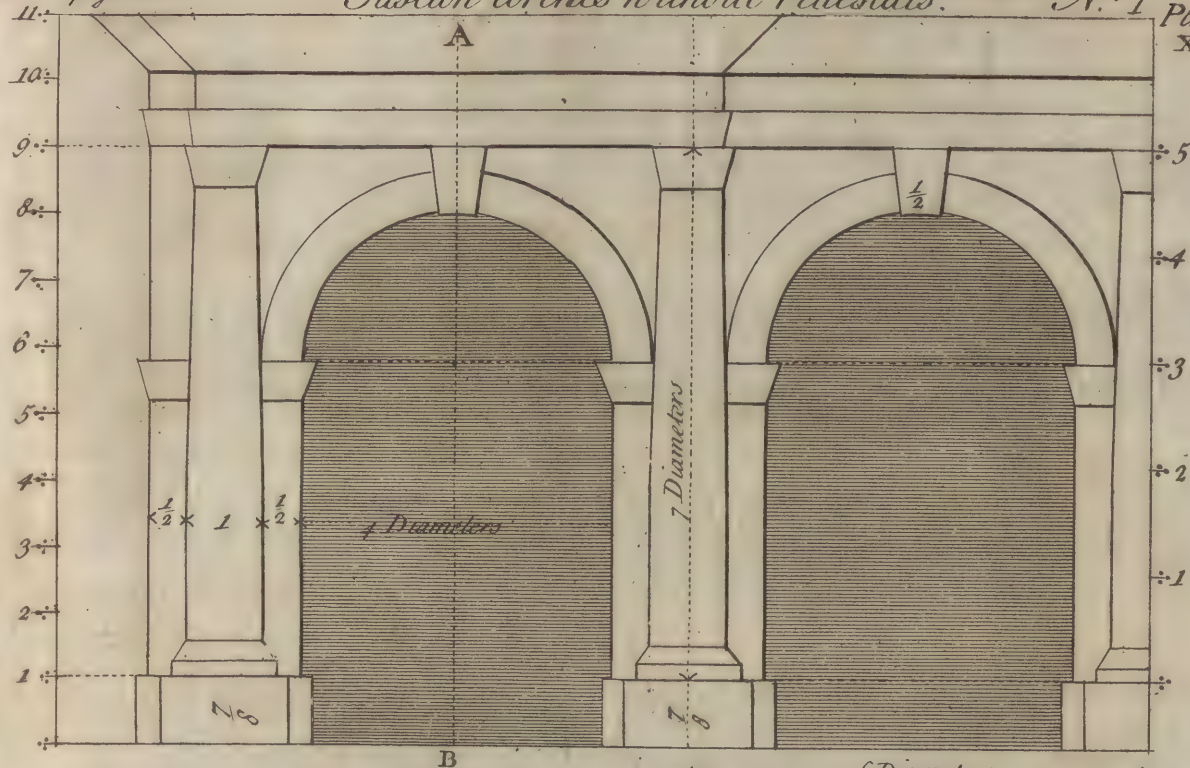
IF the Arches are ornamented with Columns, or Pilasters, between (as they usually are) then due Regard must be had to make them regular, and that they may not appear too clumsy and heavy, or too slight and trifling: The Peers should never be more than one-half of the Opening, nor less than one-third; but the chief Regulation is by the Number of Triglyphs and Modillions, as in Intercolumnations.

The Tuscan ARCH without a Pedestal. Plate XXV. No. 1.

The Height being given, divide it into eleven Parts, giving one to a Sub-plinth, eight to the Column, and two to the Entablature. For the several Heights, they were sufficiently explained in the respective Orders; but as this is somewhat different, I shall repeat it (*viz.*) After taking one for the Sub-plinth, the rest being divided into five, *vide Tuscan Order*, one is for the Entablature, the other four is for the Length of the Column, with Base and Capital; and the said Entablature, when divided into seven, four is the Diameter. Thus having got the Diameter, draw a central Line, as AB, and set off each Way two Diameters (which will make the Opening four) then give half a Diameter for the Pilaster, one Diameter for the Column, and one half Diameter for the other Pilaster; so will the Peer be just half the Opening of the Arch; then for the Top of the Impost and

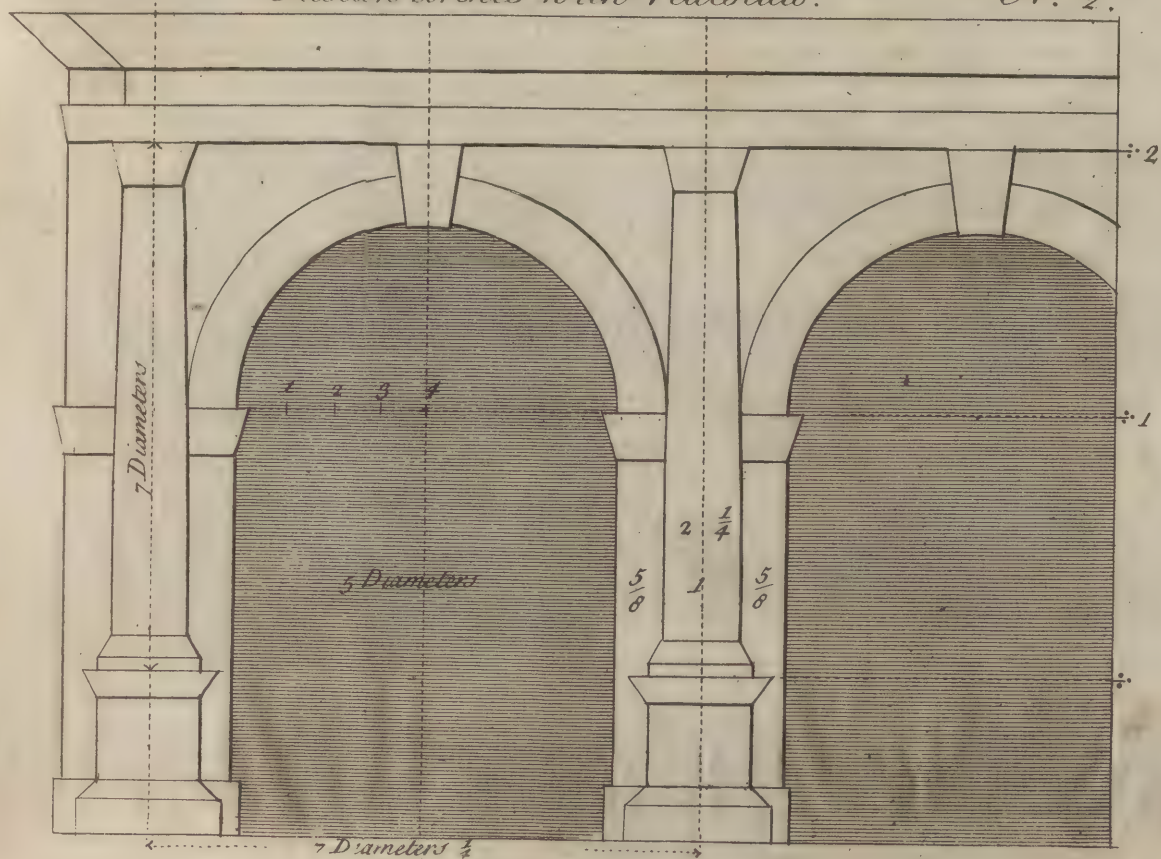
Tuscan Arches without Pedestals.

N.^o 1 Plate XXV



Tuscan Arches with Pedestals.

N.^o 2.





and Center of the Arch, divide the Length of the Column into five, as on the Right-hand, and three of the Parts high is the Height required.

Nothing more remains, but that the Impost is in Height equal to the Pilaster, as is also the Breadth of the Architraves, and the Breadth of the Key-Stone at Bottom.

It were needless to have shewn the several Mouldings here again, being so small, and sufficiently explained before at large. The Distance from the Center of the Columns is six Diameters.

The Tuscan ARCH with a Pedestal. No. 2.

When a Pedestal is placed under the Columns, you proceed exactly, as before taught, for the several Members in the Order; so that there is no Necessity of repeating them. But the Opening of the Arch must be five Diameters, and the Pilasters one-eighth thereof, which is also the Height of the Impost, Breadth of the Architrave, and Breadth of the Key-Stone at Bottom. For the Center of the Arch, and Top of the Impost, take it at half the Length of the Column, as shewn on the Right-hand; the Distance from the Middles of the Columns is seven Diameters and three-fourths.

The

The Doric ARCH without a Pedestal. Plate XXVI. No. 1.

The Height is divided into five, giving one to the Entablature, half of which is the Diameter, as before shewn in the Order. The Opening of the Arch is regulated by the Triglyphs, and cannot be otherwise than four Diameters and a quarter to have four regular Triglyphs between those over the Center of the Columns, there being one Diameter and one-fourth required from the Center of one Triglyph to the other. All the rest is much the same as the foregoing Order, only the Distance from the Centers of the Columns is six Diameters and one-fourth.

The Doric ARCH with a Pedestal. No. 2.

Having found the Diameter by the former Rules, for the entire Order, proceed as in the *Tuscan*; only the Opening must be five Diameters and one-fourth for to receive five Triglyphs between those over the Columns, with the proper Spaces, or Metops. The Distance between the Middles of the Columns is seven Diameters and an half; all the rest must be easy by the foregoing.

The

Doric Arches without Pedestals.

N^o 1 Plate XXVI



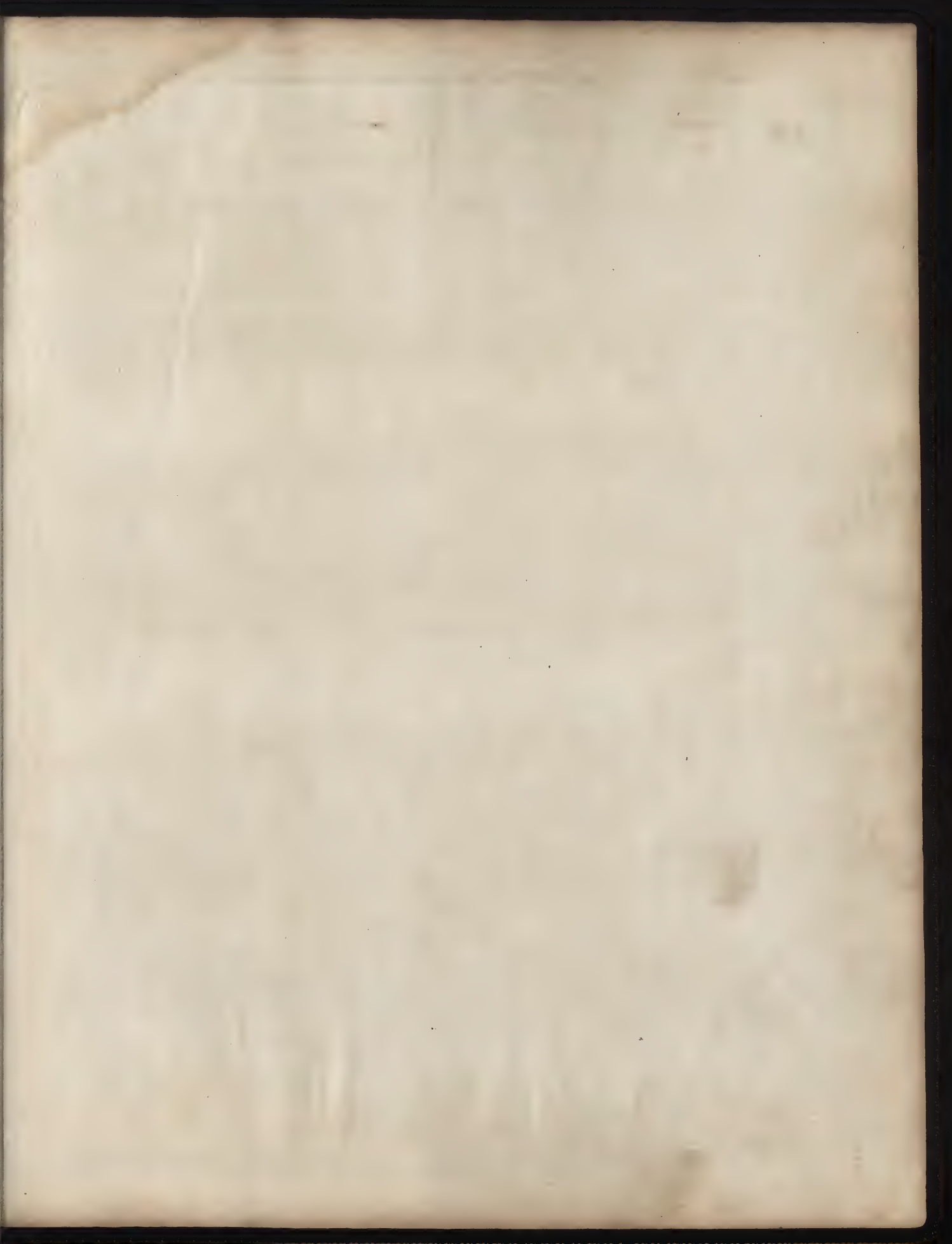
Doric Arches with Pedestals

N^o 2

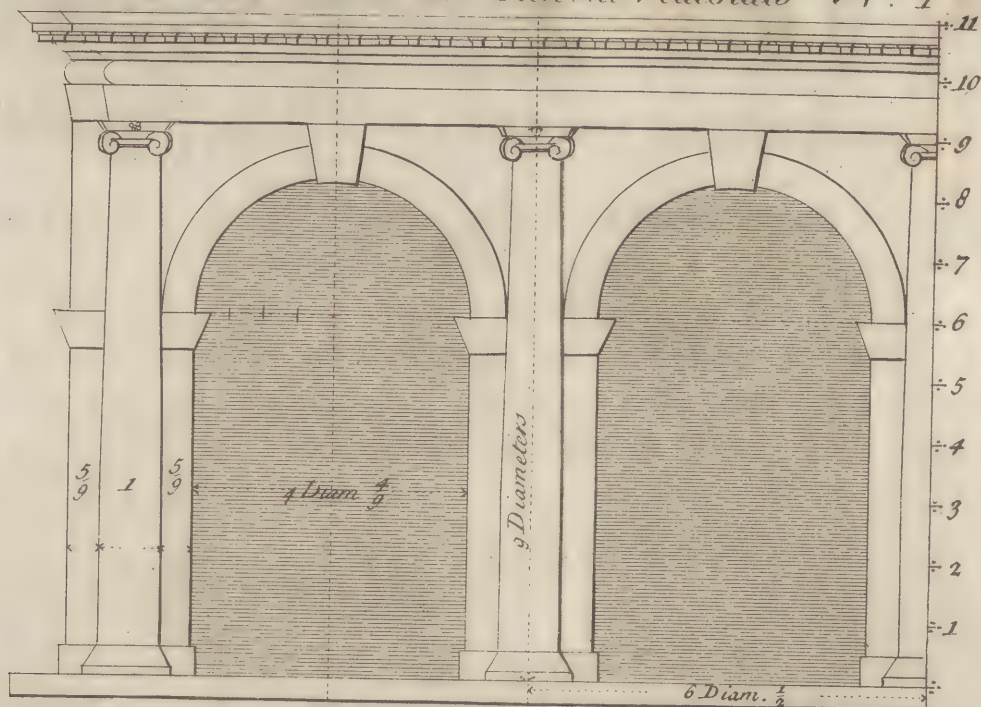


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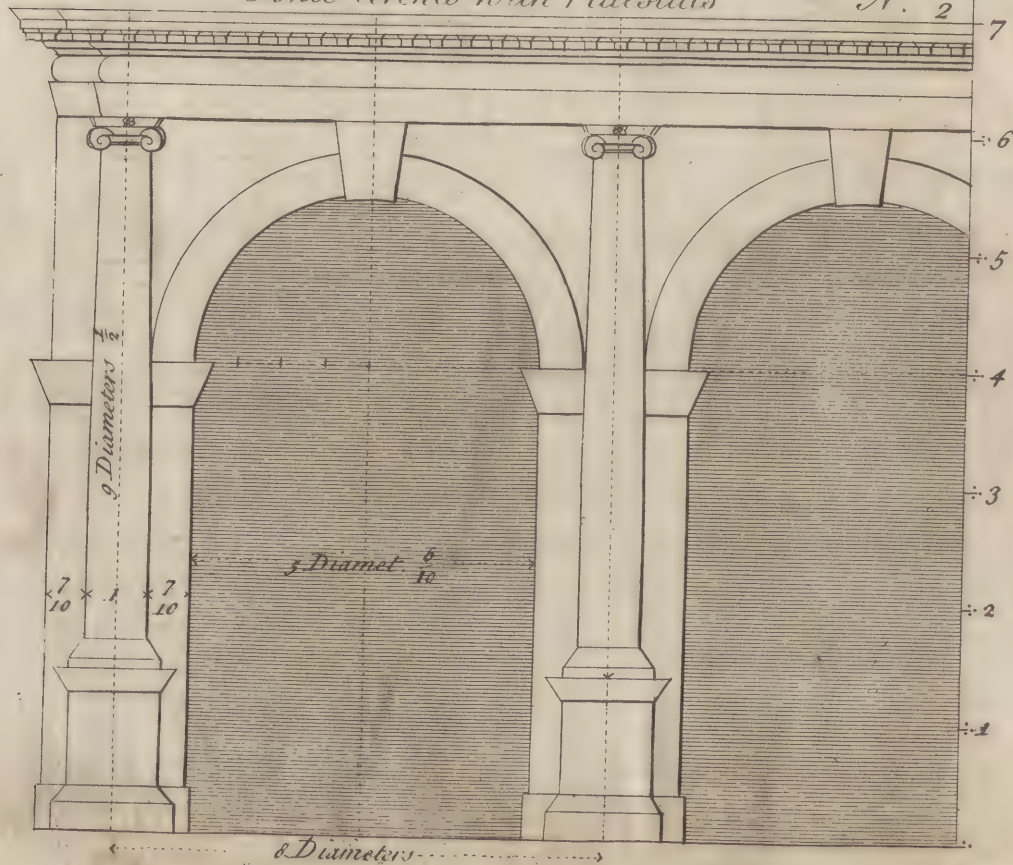
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Tonic Arches without Pedestals N^o 1 Plate XXVII



Tonic Arches with Pedestals N^o 2



The Ionic ARCH without a Pedestal. Plate XXVII. No. 1.

The Height is divided into six for finding the Proportions of the Entablature and Column, as before taught in the Order. The Opening of the Arch is governed by the Number of Modillions, and for that Reason cannot be much varied. The Space from the Center of one Modillion to another being half a Diameter, and the Distance of the Centers of the Columns is here six Diameters and an half, and the Opening of the Arch will be four Diameters and four-ninths, and the Pilasters five-ninths; all which admits of twelve Modillions between those in the Center of the Columns. The Impost, Architrave, and Bottom of the Key-Stone, are the Bigness of the Pilaster as usual.

For the Center of the Arch, and the Top of the Impost, divide the whole Height into eleven Parts, as on the Right-hand Side, and six Parts high is the Height required.

The Ionic ARCH with a Pedestal. No. 2.

The Diameter being found, by the former Rules, for the whole Order, proceed as before, and observe, that this Arch is also ruled by the Number of Modillions, which is here fifteen, between those in the Center of the Columns; and also in this Arch there is a Modillion in the Center; but that of No. 1. hath a Space in the Center thereof, and the Distance between the Middles of the Columns are here eight Diameters, the Opening five and six-tenths, the Pilasters, &c. seven-tenths. The Center of the Arch, and Top of Impost, is found by dividing the whole Height into seven Parts, and give four in Height for the same.

The

The Corinthian ARCH without a Pedestal. Plate XXVIII. No. 1.

There is no manner of Difference between this and the Arch of the *Ionic* Order, except in the Order itself, and the Number of Modillions between, here being but ten; and the Height of the Center of the Arch, and the Top of the Impost, is somewhat different, being found by dividing the whole Height into nine, and taking five for the Height; all the rest is the same.

The Corinthian ARCH with a Pedestal. No. 2.

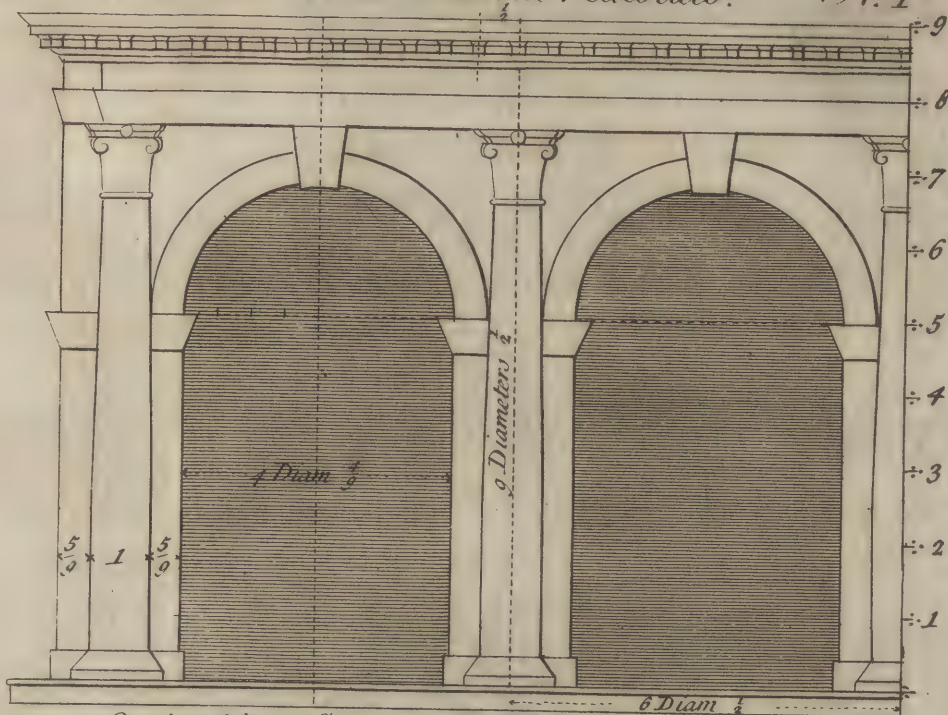
This Arch is also formed as the foregoing, except the Number of Modillions between, here being but thirteen, and the Distance between the Middles of the Columns is eight Diameters and one-third, the Opening five and five-sixths, the Pilasters, &c. three-fourths. The Center for the Arch, and Top of the Impost, as before.

The Composite ARCH without a Pedestal. Plate XXIX. No. 1.

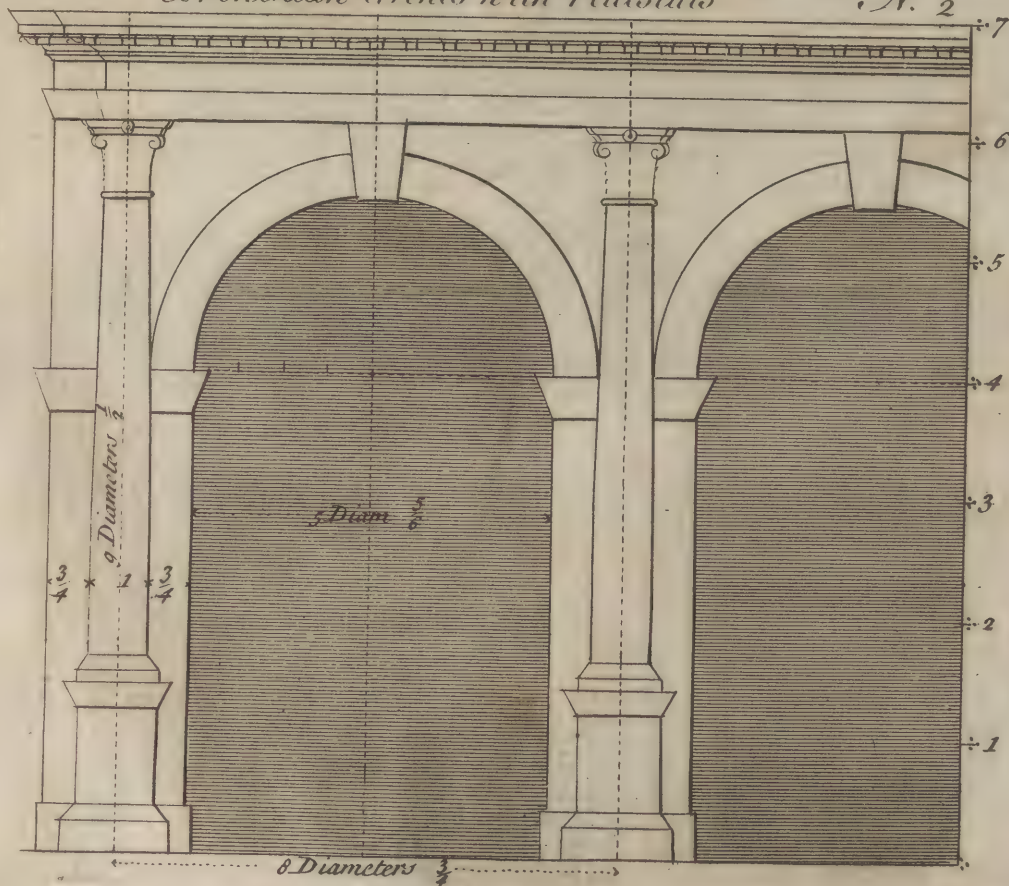
Having performed the foregoing Arches, no Difficulty can arise in this, it being the same, except in the Dress of the Order, and the Number of Modillions between, here being thirteen, and the Distance of the Centers of the Columns is six Diameters and two-thirds; the Opening of the Arch four Diameters and an half, and the Pilasters, &c. four-sevenths; all the rest is exactly the same as the *Corinthian*.

The

Corinthian Arches without Pedestals. . N. 1^o

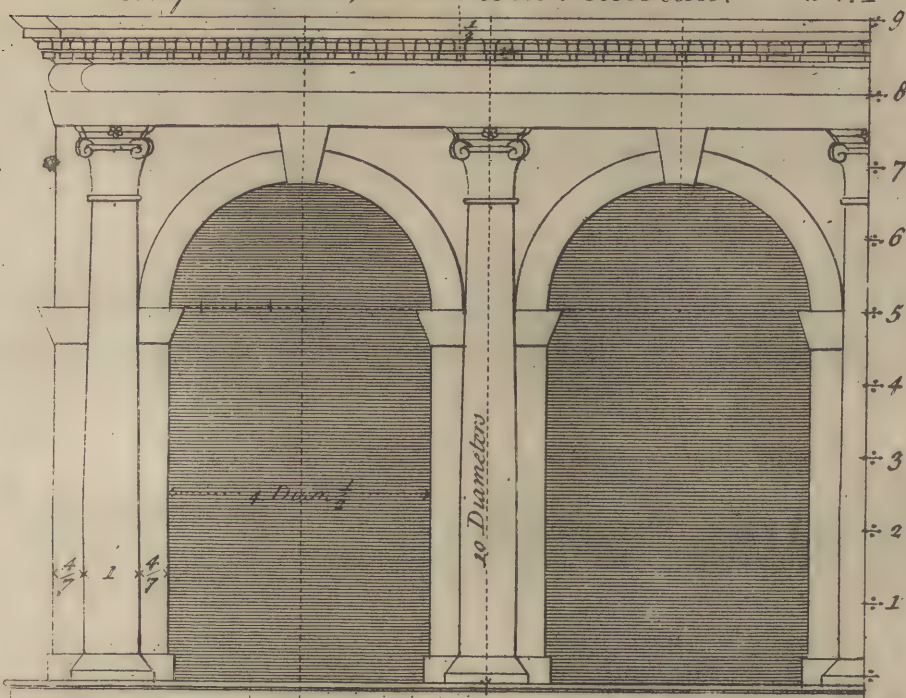


Corinthian Arches with Pedestals. . N. 2^o



Composite Arches without Pedestals.

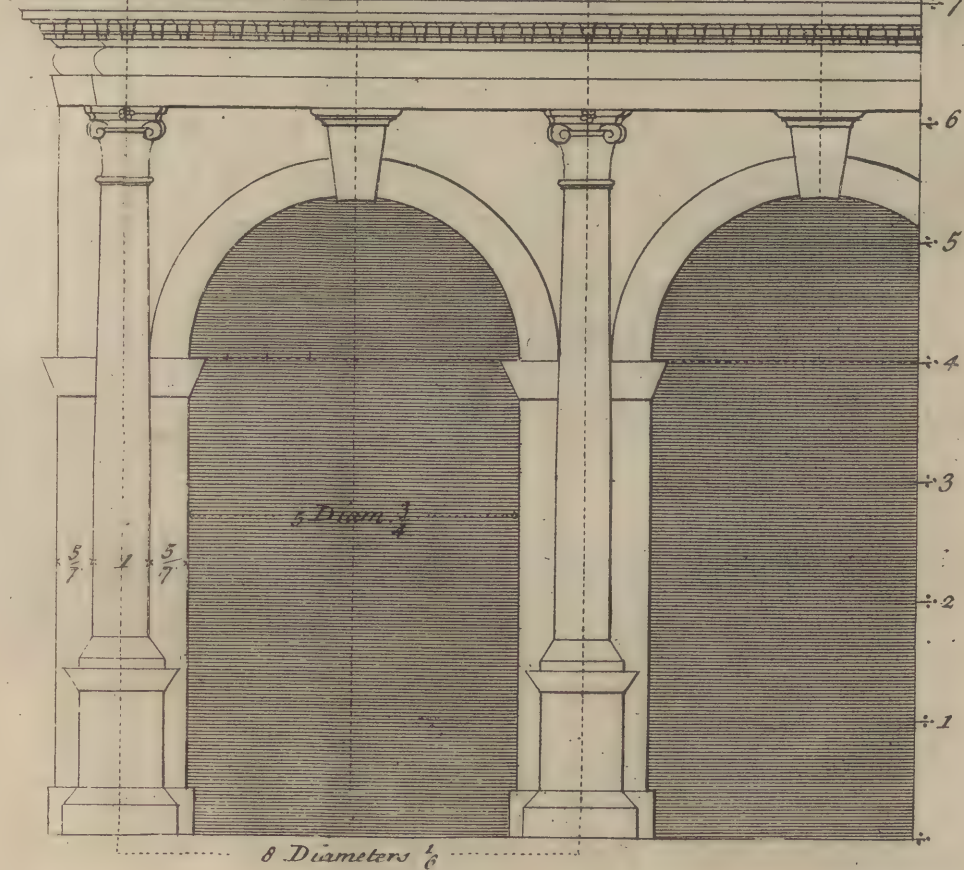
N. 1 Plate XXIX



Composite Arches with Pedestals.

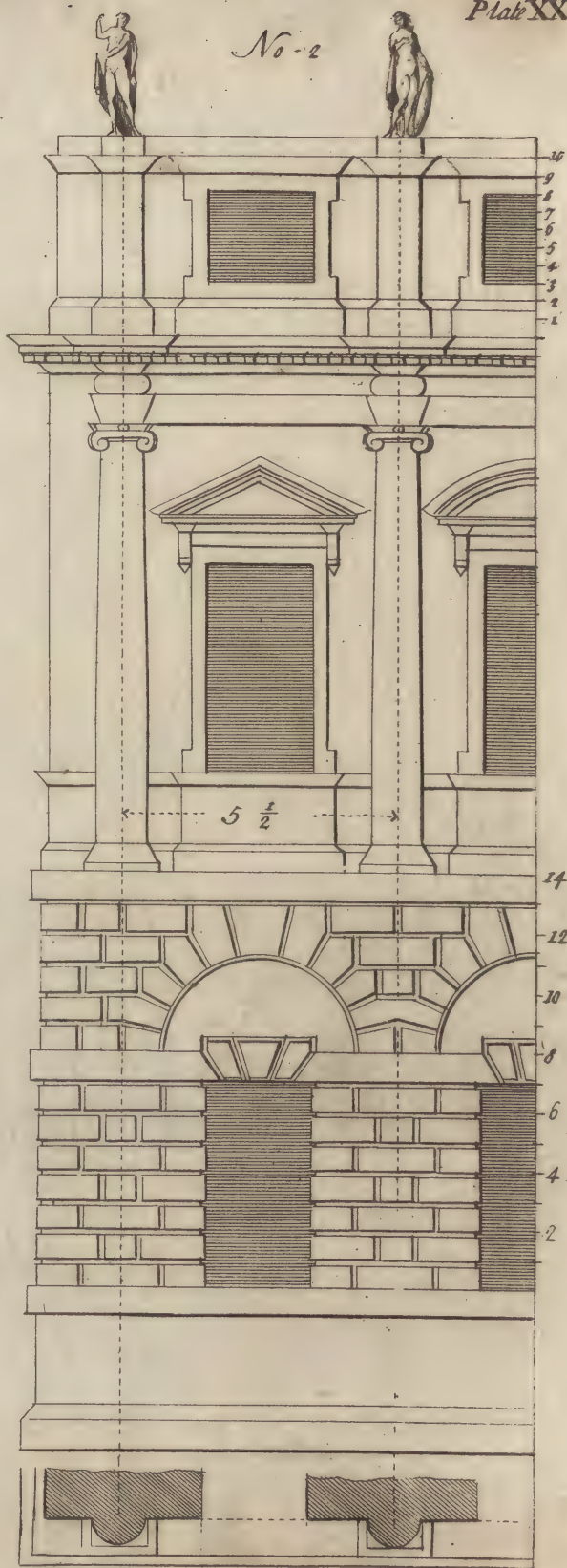
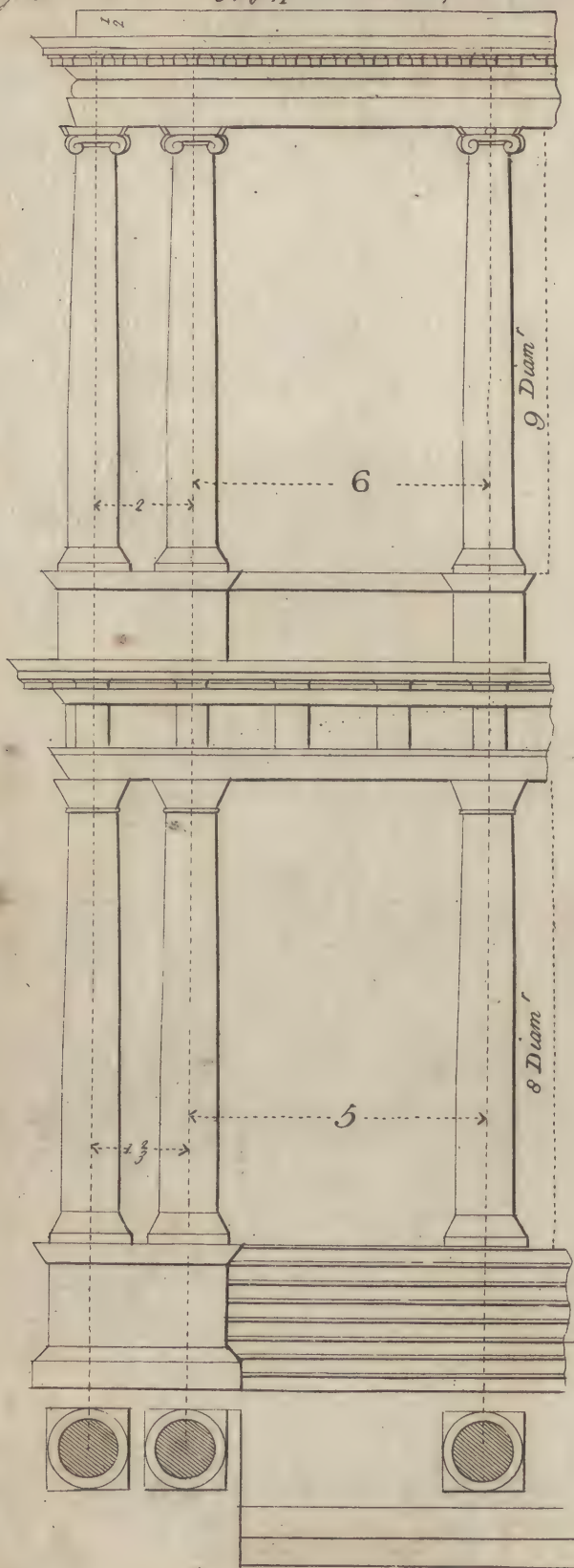
6 Diam. $\frac{1}{2}$

N. 2









The Composite ARCH with a Pedestal. No. 2.

This Arch also doth admit of very little Variation, being much the same as the *Corinthian*, except that there are sixteen Modillions between, and the Distance of the Centers of the Columns in eight Diameters and one-sixth; the Opening five Diameters and three-fourths; the Pilasters, &c. five-sevenths. All the rest as before.

There may be an Objection to the Figuring of these Parts, because they will not be exactly to the Fractions here set down, but if the Geometrical Manner of finding the several Parts be but observed, as on the Line of the Center of all the Arches, where half the Space between the Columns is divided into five, (*i. e.* the whole into ten) giving one to each Pilaster, and eight to the Opening. I say, if this Method be well understood, no Difficulty will be found throughout the Whole.



To regulate the ORDERS when used over each other.
Plate XXX.

PALLADIO, in his Second Book, Plate IV. hath given us the *Ionic* Order placed over the *Doric*, where he has made Couplets of Columns on the Angle of the Building so near together, as to have but one Metop between, which (by the Way) could not be done, if the foregoing Rules are observed, without making the said Metop too wide for the Height, or

K not

not giving the Base and Capital their proper Projection, there being but one Diameter and one-fourth between the Center of one Triglyph to the other, as mentioned in the *Doric Arch*. However, for those that shall chuse to follow this Manner, in No. 1. you have Columns placed as close together as could be in Consideration of the Number of Modillions, to be regulated in the *Ionic* Order, over which, from Center to Center of the Modillions, is half a Diameter, as in the *Ionic Arch*; and here must be three Modillions between, otherwise there would not be Room for the Bases of the under Order.

The Diameter of the Columns of the upper Order must be equal to the Top, or diminished Part of the under Order, therefore dividing five Diameters of the *Doric* into six Parts, one will be the Diameter for the *Ionic*, and equal to the Top of the *Doric* Columns; as to the other Proportions, they are sufficiently shewn before, except in the Pedestal of the upper Order, where the Base and Plinth is omitted, not only because it would project over, and load the under Cornice, but also that it would be too high for the Windows, which stand thereon. The Method of finding the Height therefore is this; The Diameter of the Column being found as above, and the Column nine Diameters high, divide it into five Parts, one such will be the Height of the Entablature, and another the Height of the Pedestal, so that, when put together, if the whole Height were divided into seven, one is the Height of the Pedestal, five the Column, and one the Entablature. For the Cap of the Pedestal, if you observe the *Ionic* Order, you will find the Height to be one-fifth of the Dado and Cap taken together. By this Example it may be seen how disagreeable the Metops
appear,

appear, when they are not nearly, or quite a Square, as they ought to be.

The aforesaid excellent *Author* has, in Plate VI. of the said Book, exhibited a beautiful Front of the *Ionic* Order, raised on a Basement of Rustic Work, with Arches over the lower Windows, extending the Breadth between the Plinths of the Columns, and having Attic Pilasters over the Columns. The Whole being so fine a Composition, it is here inserted to be something farther explained than what he has done, as No. 2.

The Basement (being somewhat higher than the intire Order) is divided into seven Parts, giving two to the Pedestal, and five to the Rustics, which, being divided into fourteen, will give the Height of each Course, and also the Bandages, or Facia's.

The Order hath no Pedestal, but is formed according to the former Rules; there is a Kind of Inter-pedestal between the Columns, which are a Stool, or Breast-work to the Windows, and is made the Height of the Entablature, or one-fifth of the Length of the Column. The Windows are two Diameters of the Column wide, and four high; the Attic Pilasters are double the Height of the Entablature, and their Diameter equal to the Column at Top; their Height is divided into ten Parts, giving two to the Base and Plinth, seven to the Shaft, and one to the Cap; the square Plinth to the Figures is equal to one of the said Parts.

The *Author* hath been exceeding lavish in the Decoration of this Piece, as may be seen by inspecting the Original as above. Here is some Variation from him, in adding more Strength to the Corner of the Building, by making that Peer equal to the others, and the Entablature is not continued round the Building.

It is an Objection made by some against the breaking the Entablature over each Column, nor, indeed, this Author seldom doth, but it is followed by many, especially that great Master *Inigo Jones*, in that stately Building the Banqueting-House at *Whitehall*.

The DORIC and IONIC Orders over the TUSCAN.
Plate XXXI.

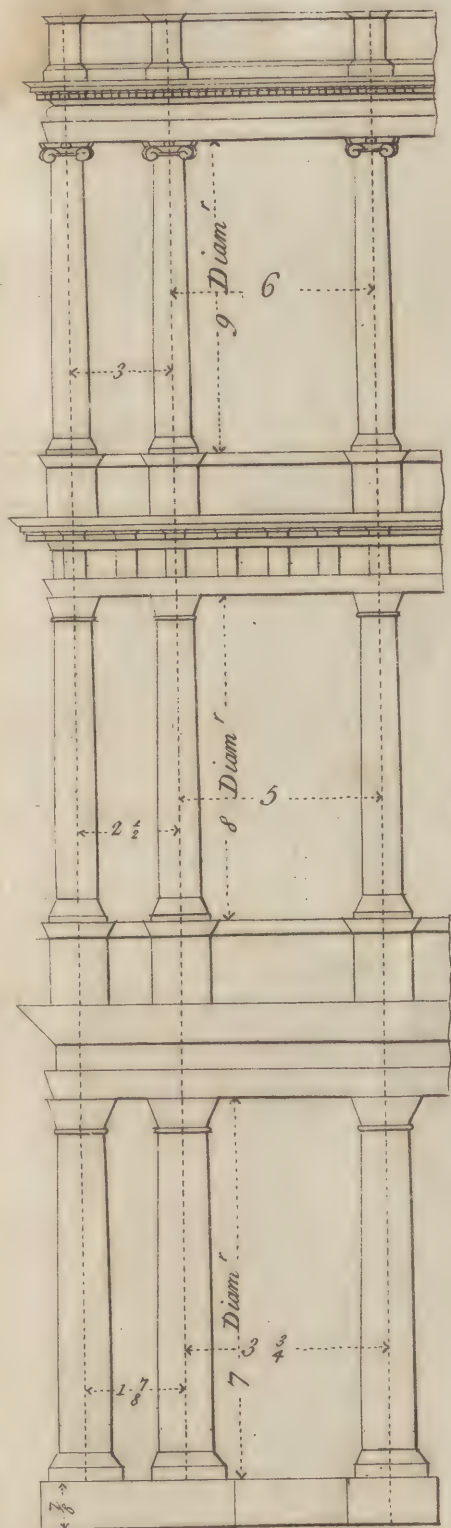
If a Triglyph be added between the Columns of the *Doric* Order, the Metops, or Spaces between, may then be made agreeable to the former Rules. As in this Example on the Left Hand, No. 1. you have the *Doric* on the *Tuscan*, and the *Ionic* on the *Doric*. Though the *Tuscan* is seldom used in this Manner, it is here added to shew the strict Regard that ought to be had to the placing the Centers of the Columns over each other, and the regulating their Diameters. The Tops of the under Order giving the Bottom of the upper one, as mentioned before.

Here are also Pedestals added above the *Ionic* Order, whereon to set Figures, Vases, &c. Their Height is equal to the Entablature, as is also the other Pedestals under the Columns, the other Proportions are before shewn.

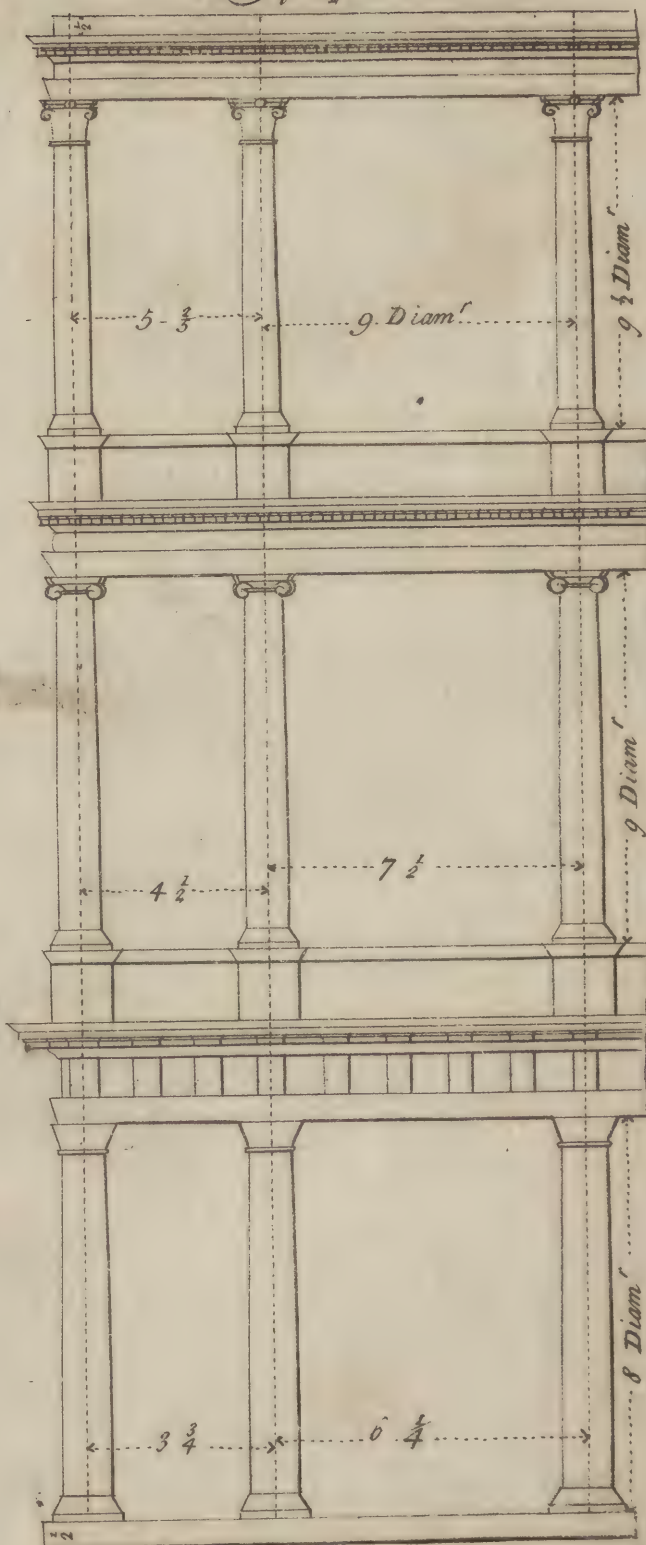
In No. 2. on the Right-Hand, you have the *Ionic* and *Corinthian* Orders over the *Doric*, where the Intercolumnations are varied from the others, here being two and four Triglyphs between in the *Doric*, all the rest has (it is to be hoped) been sufficiently explained before, and the Distance from the Centers of the Columns are figured in this and all the others.

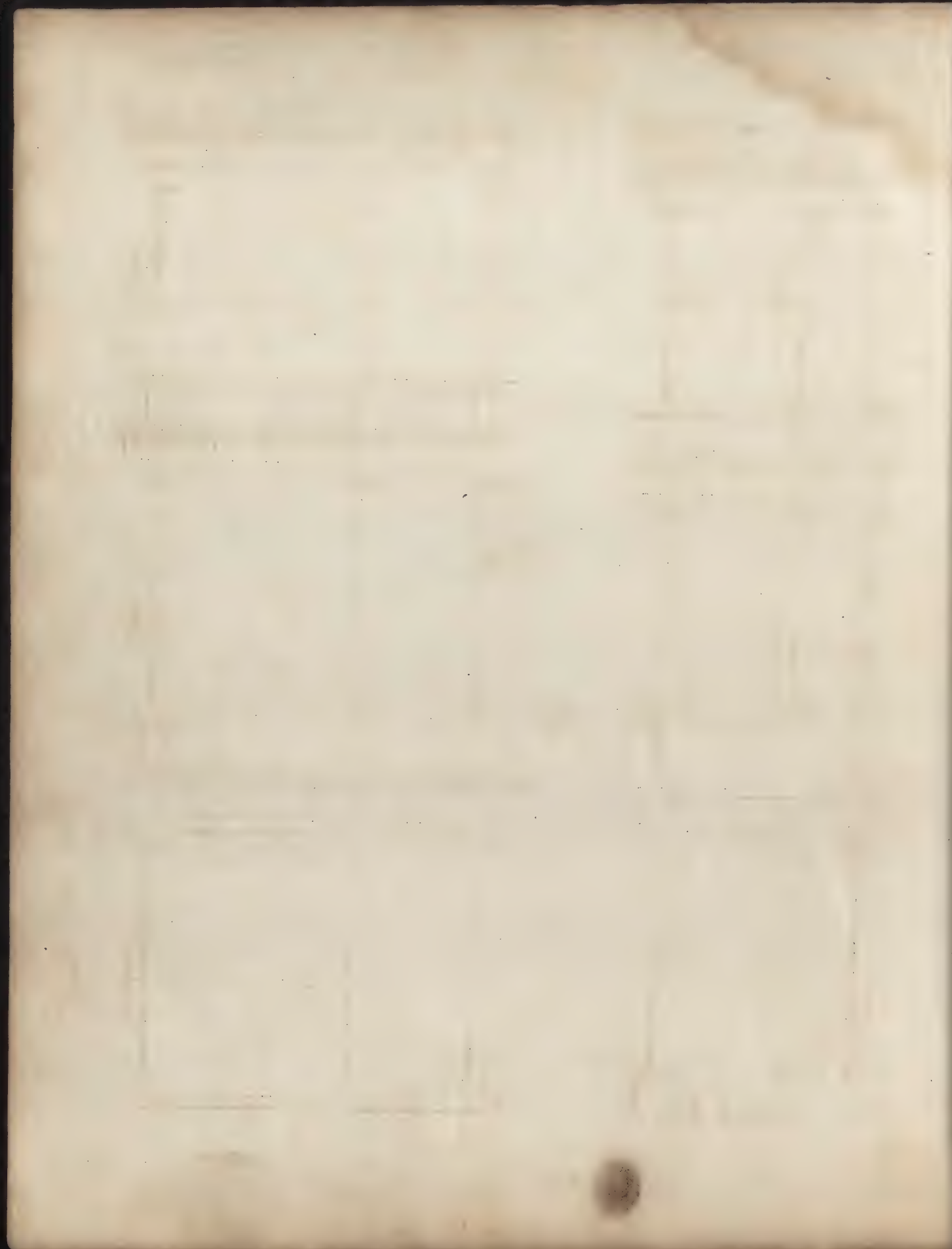
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N^o. 1

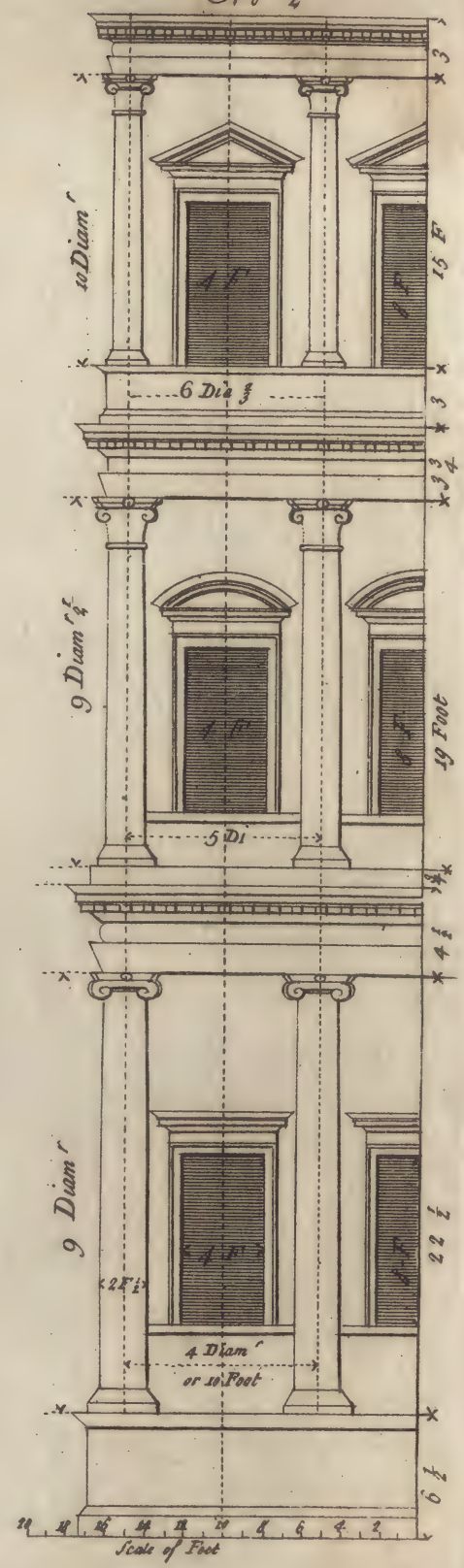
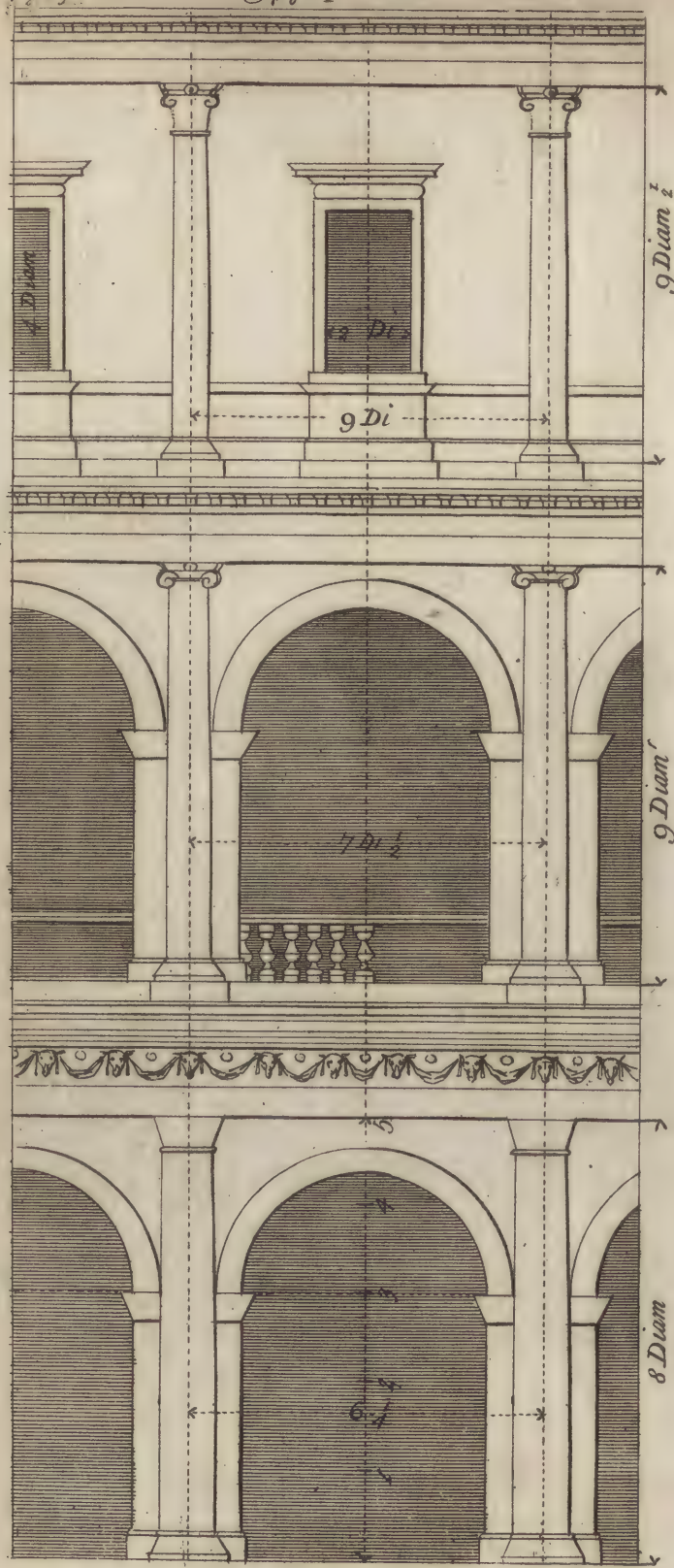


N^o. 2









This large Intercolumnation may be censured, it seeming to want the Assistance of a Column between, but if Arches are introduced, it will not be too large, as is shewn in the next Plate.



To make ARCHES upon ARCHES. Plate XXXII.

IN the Formation of *Arches* over one another, together with the *Orders*, PALLADIO has given us a fine Instance of, in the before recited Book II. Plate 23. where he has the *Ionic* and *Corinthian* over the *Doric*, but without Pedestals to the upper Order.

Something in the same Taste, and conformable to the before-going Rules is this Example, No. 1. The Center, from Column to Column, is six Diameters and one-fourth, and would admit of four regular Triglyphs between, and instead thereof he has introduced the Ox's Heads, Drapery, &c. and has also left out the Mutules in the Cornice. The Arch is formed exactly as before taught in the *Doric* Arch, Plate XXVI.

The *Ionic* Order stands on a Sub-plinth half a Diameter high; the Intercolumnation is seven Diameters and an half, and admits of fourteen Modillions between. The Center of the Arch is found by taking half of the intire Order.

There is a Balustrade in the Arch whose Height (including the Sub-plinth) is equal to the Entablature.

The *Corinthian* Order also stands on a Sub-plinth half a Diameter high. The Intercolumnation is nine Diameters, and
hath

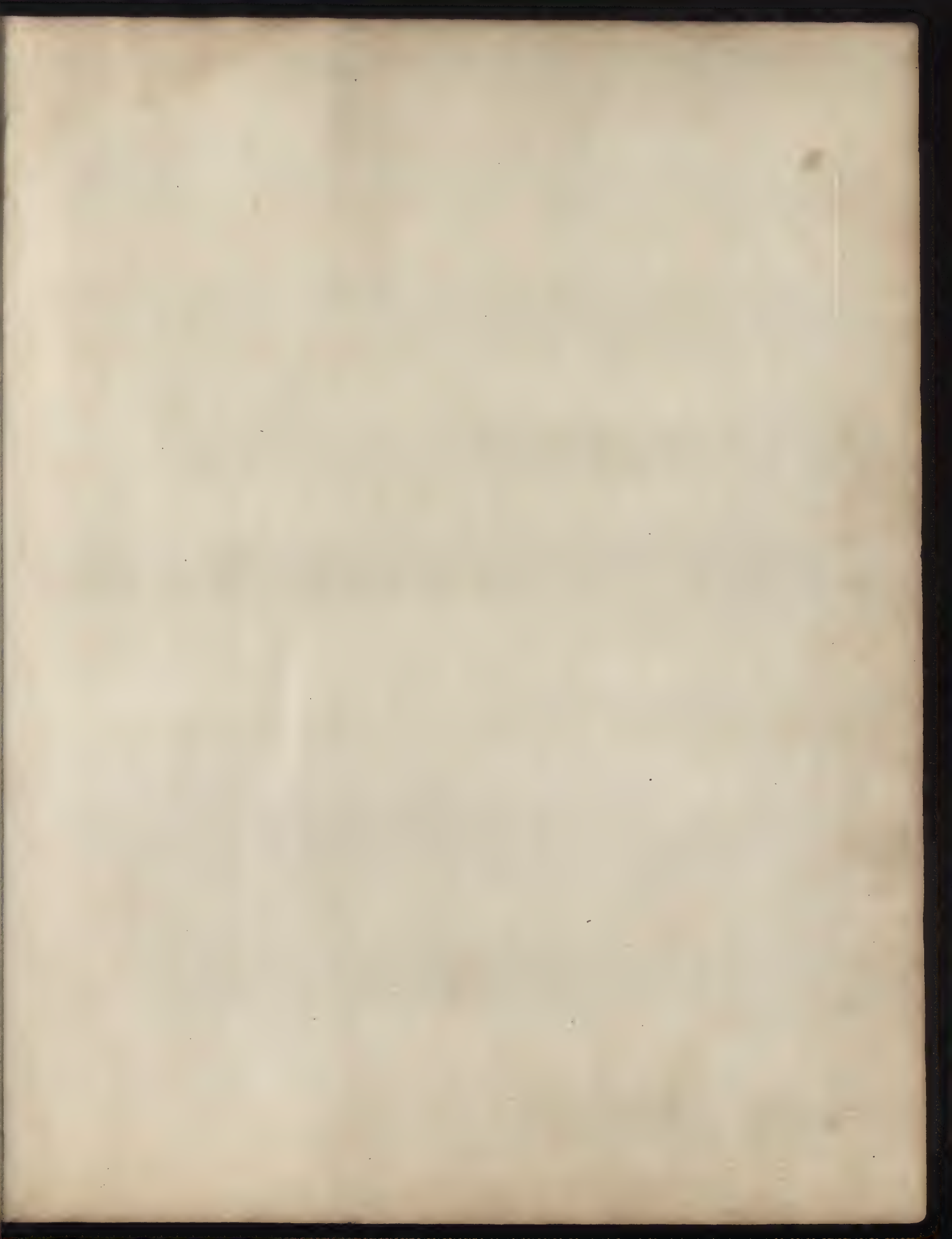
hath the same Number of Modillions, being exactly over the under ones.

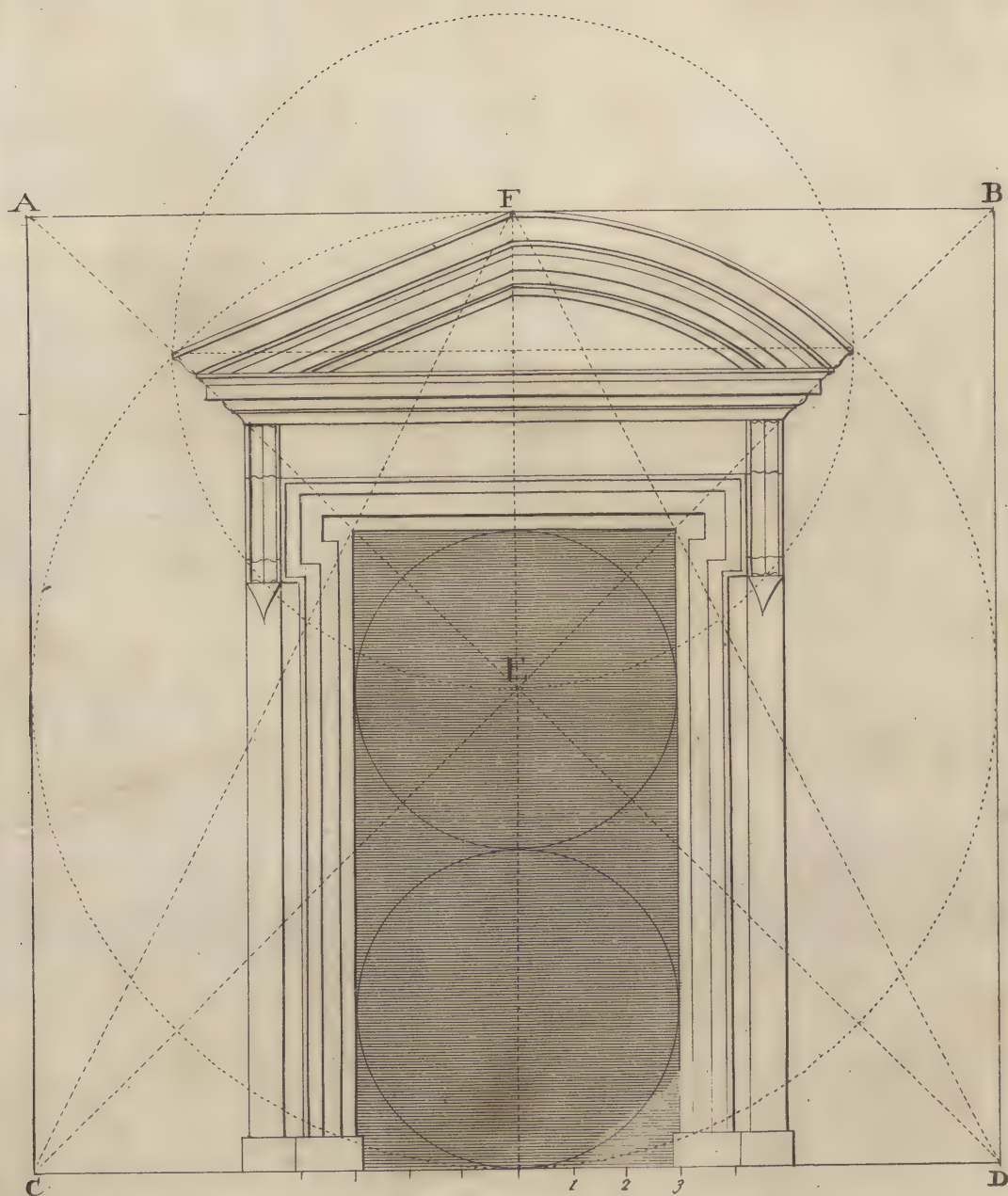
Here is Windows over the Arches four Diameters high, and two wide, with a Pedestal under them, the Height of the Entablature.

No. 2. is the *Corinthian* and *Composite* Orders on the *Ionic*, from a Design in the same Book, Plate 55. It is a little various from the before-going Rules of making the Bottom of the upper Order equal to the Top of the under one. The Proportions of these Orders being as five, four and three, which, in the *Ionic* Order, is very near, but makes the *Corinthian* Columns too small; however, it having such an Authority, it is not altered.

The Distance from Center to Center of the Columns, in the *Ionic*, is four Diameters, and admits of seven Modillions between. The *Corinthian* five Diameters, and hath the same Number of Modillions. The *Composite* Order is six Diameters and two-thirds, and hath thirteen Modillions between.

The *Ionic* Order is raised on a Pedestal, the *Corinthian* on a Sub-plinth, and the *Composite* on a Pedestal. Also the Windows are on Pedestals, as high as the respective Entablatures, and all the Measures being figured in Diameters and Feet, together with a Scale of Feet at the Bottom, cannot need more Explanation.





*Of Doors, or Gates, and Windows.*

THESE have their Heads generally square and sometimes circular, which last must not be used if the Impost is not above the Height of a Man.

There is no certain Proportion for their Opening, they being generally twice the Breadth in Height, and should never exceed two Squares and a fourth Part. Here follows a great Variety of them, for every one to please themselves, and first, a Method of disposing of the different Parts by a Geometrical Rule. Plate XXXIII.

Make the Square A B C D, each Side being equal to three times the Breadth of the Opening intended; and the Diagonals A D, and B C, being drawn intersecting in E, gives a Center for the Pitch of the Pediment F, also the Lines F C, and F D, being drawn, will cut the Diagonals at the proper Height, and Breadth of the Door, which will be two Diameters high, as appears by the Circles.

The Architrave round the Door is one-sixth of the Breadth, the Freeze the same, and the Cornice one-fourth Part more.

The Knee of the Architrave is one-third thereof, and the Pilaster two-thirds thereof, the rest must be easy by Inspection.

Plate XXXIV.

On the Left Hand is a *Tuscan* Door, according to the former Rules, with a pitch Pediment.

On the Right Hand is a *Doric* Door, with half Columns, and Pilasters Wing-ways, on the Sides, and a circular Pediment.

Plate XXXV.

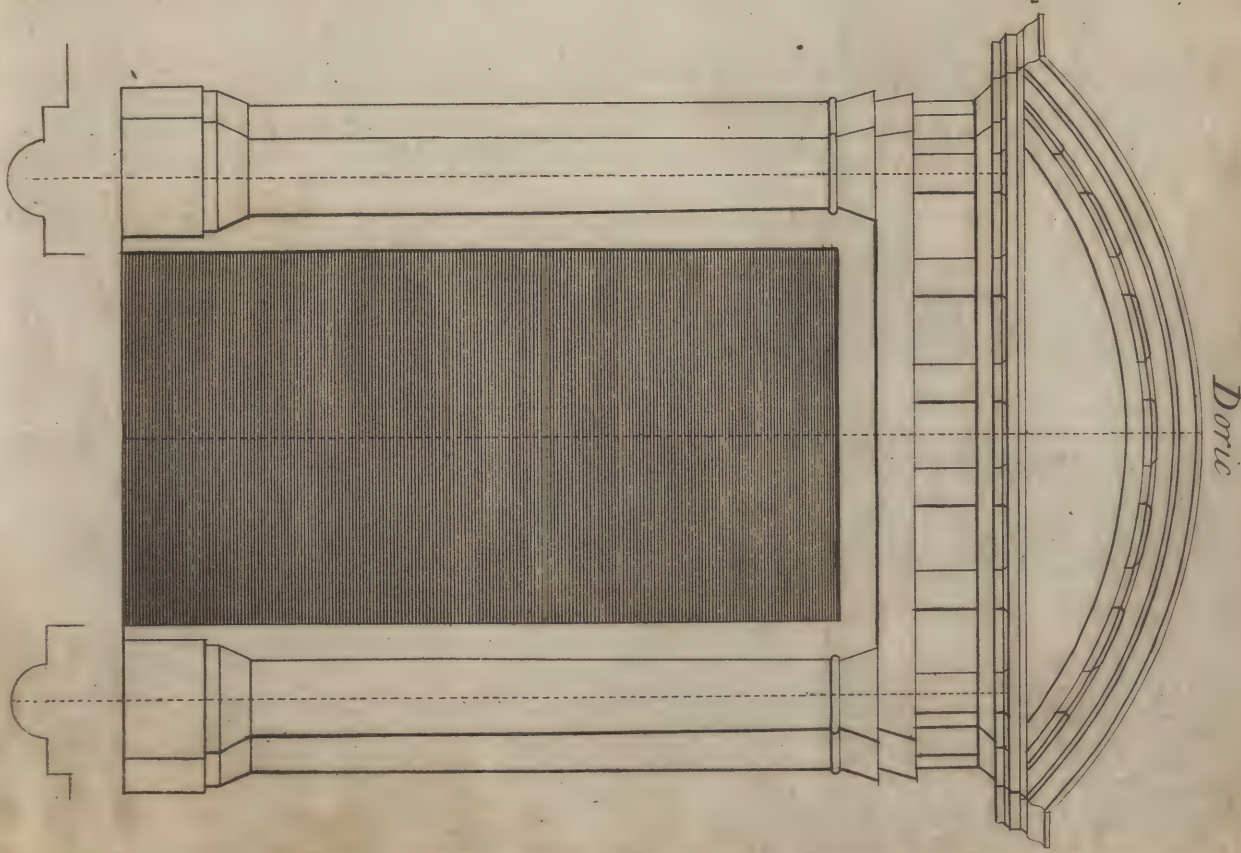
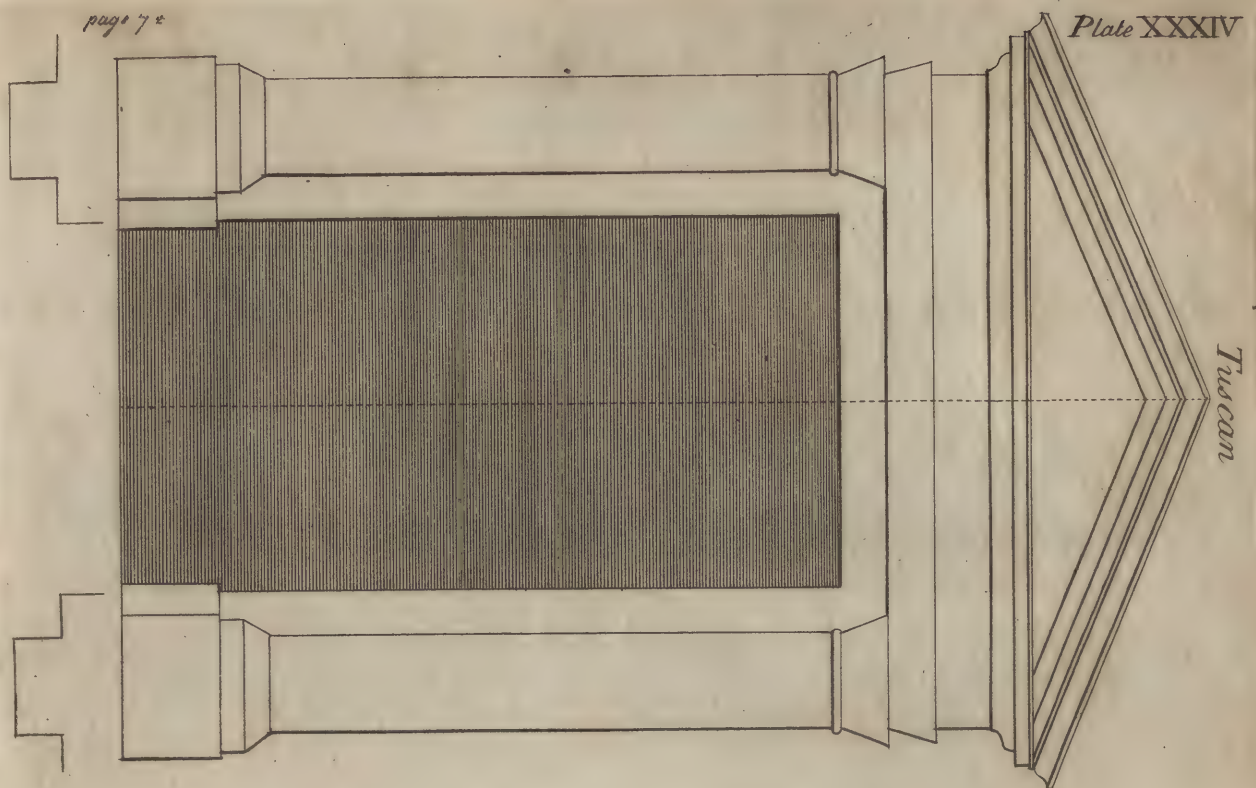
On this Plate are two different arched Doors, as well in the Rustic Grounds, and other Embellishments, as in the Orders themselves ; they are according to the foregoing Rules, except in the *Ionic* Cornice, where, instead of the Modillions, is introduced a Dentel Bed-mold.

Plate XXXVI.

This Plate contains four different Designs for Doors or Gates (though they appear but as two at first Sight.)

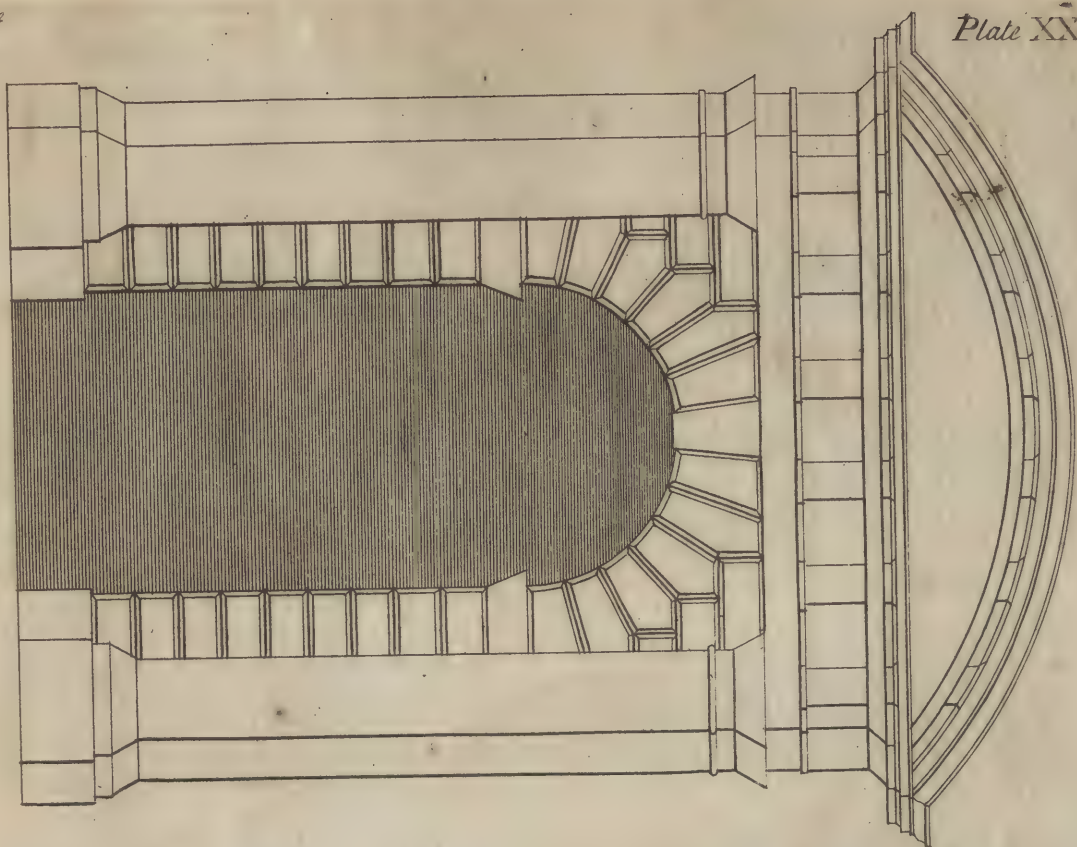
The first (beginning on the Right Hand Side) is the *Tuscan* Order, having Columns and Pilasters behind them, with an Attic Part over the Whole. The next is the *Doric*, with a Balustrade at Top. One half of the other Design, shews an arched Door with *Ionic* Columns, and Pilasters, and a Balustrade at Top ; the other Half is a Square Door, with three-quarter Columns and Pilasters Wing-ways, and a pitch Pediment at Top. The Proportions of these last are figured, therefore must be easy by Inspection.

Plate

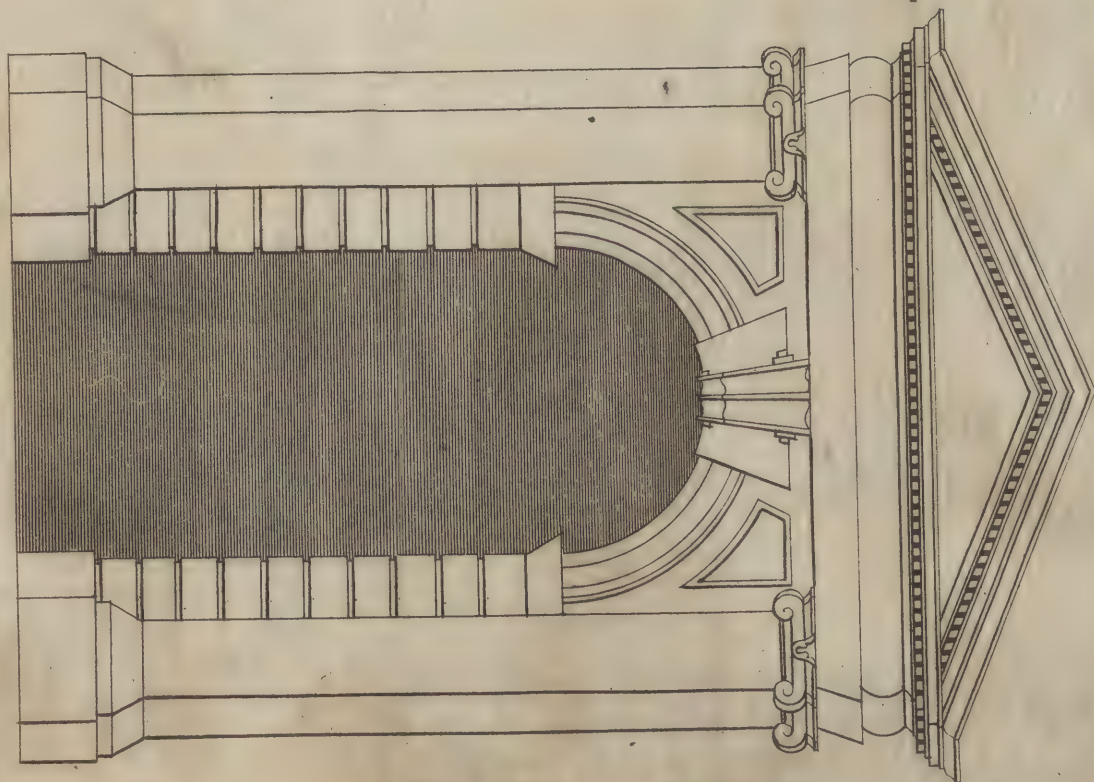


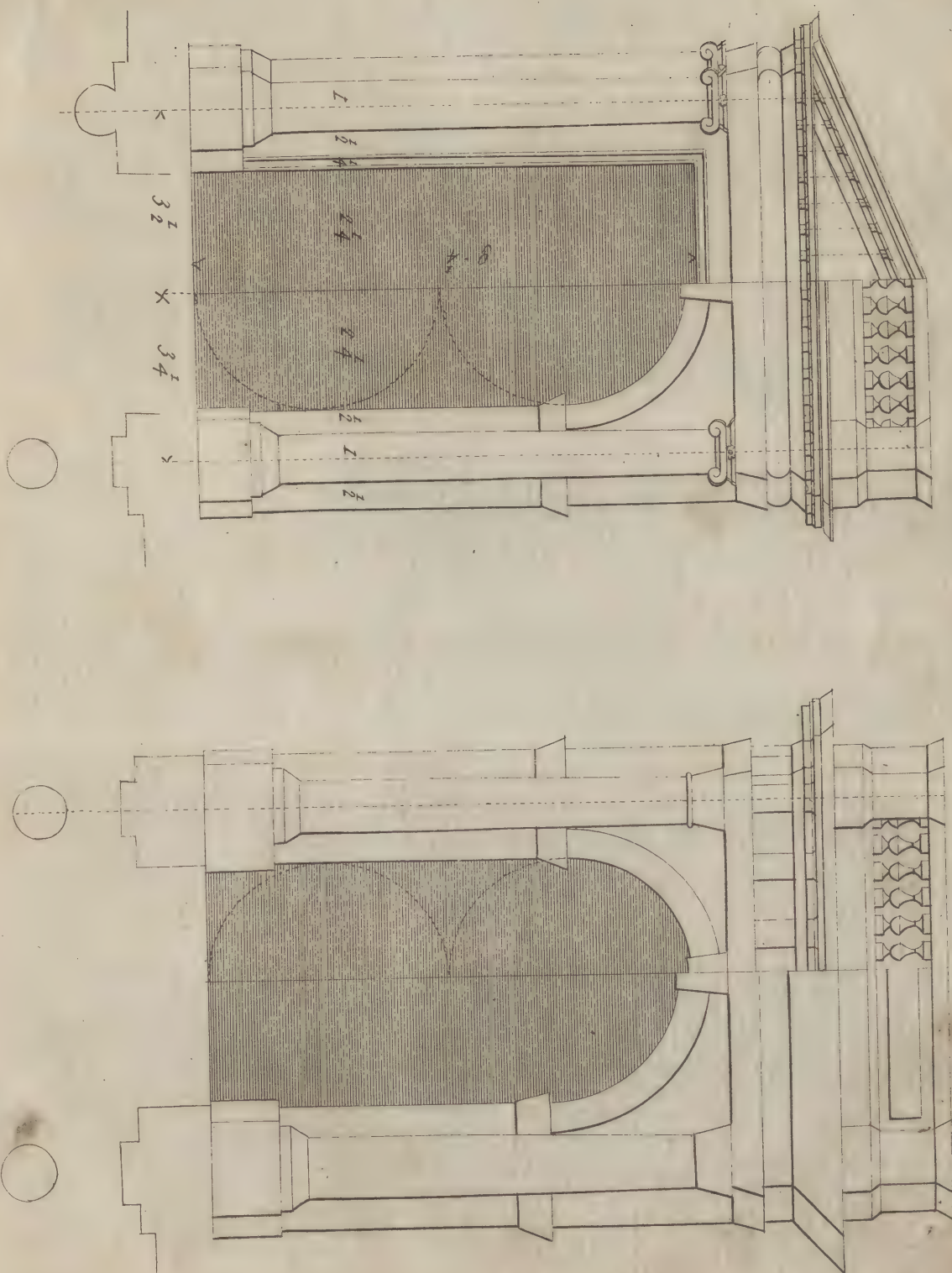


Doric



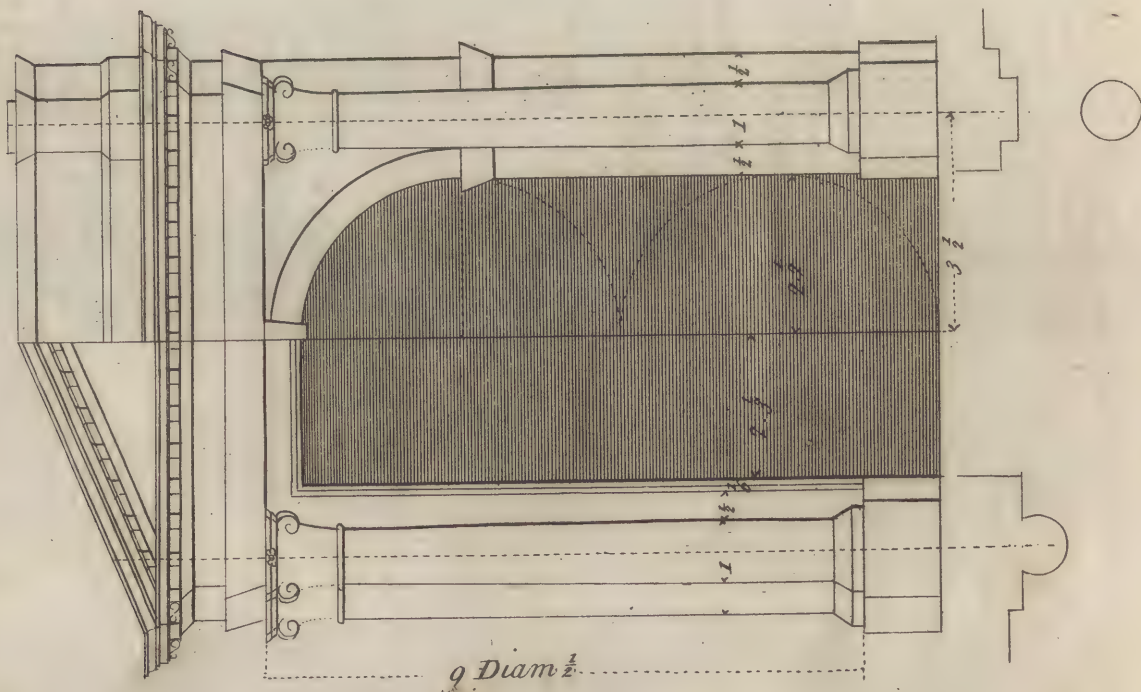
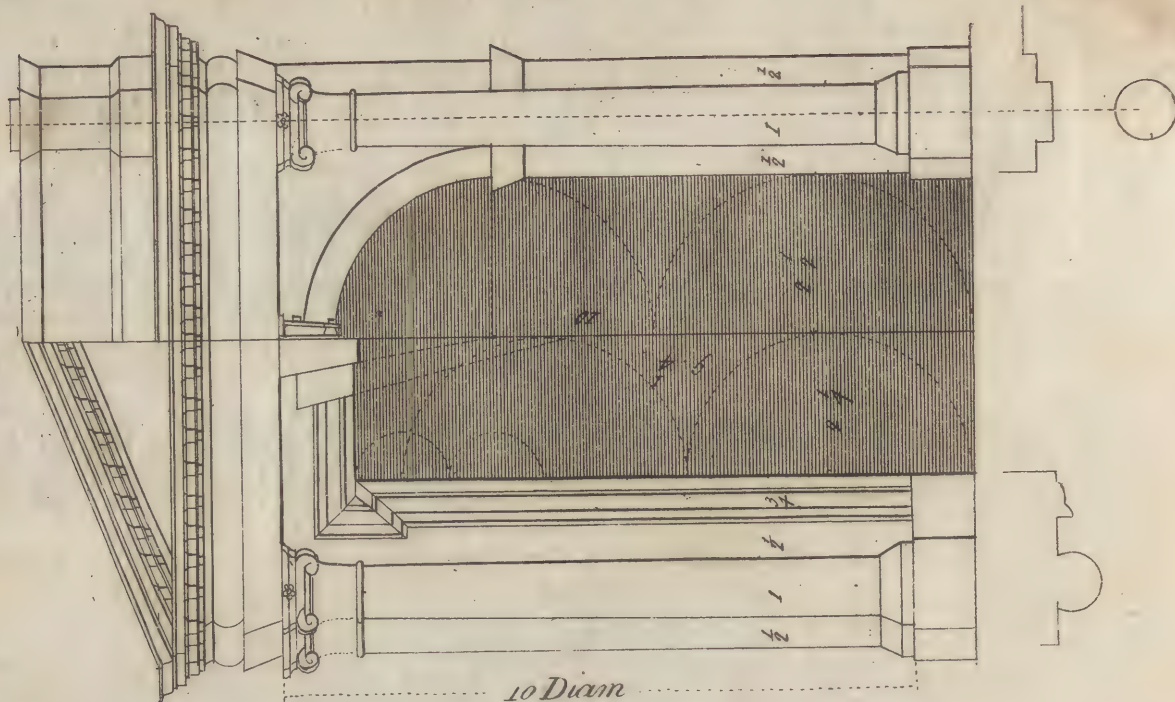
Ionie



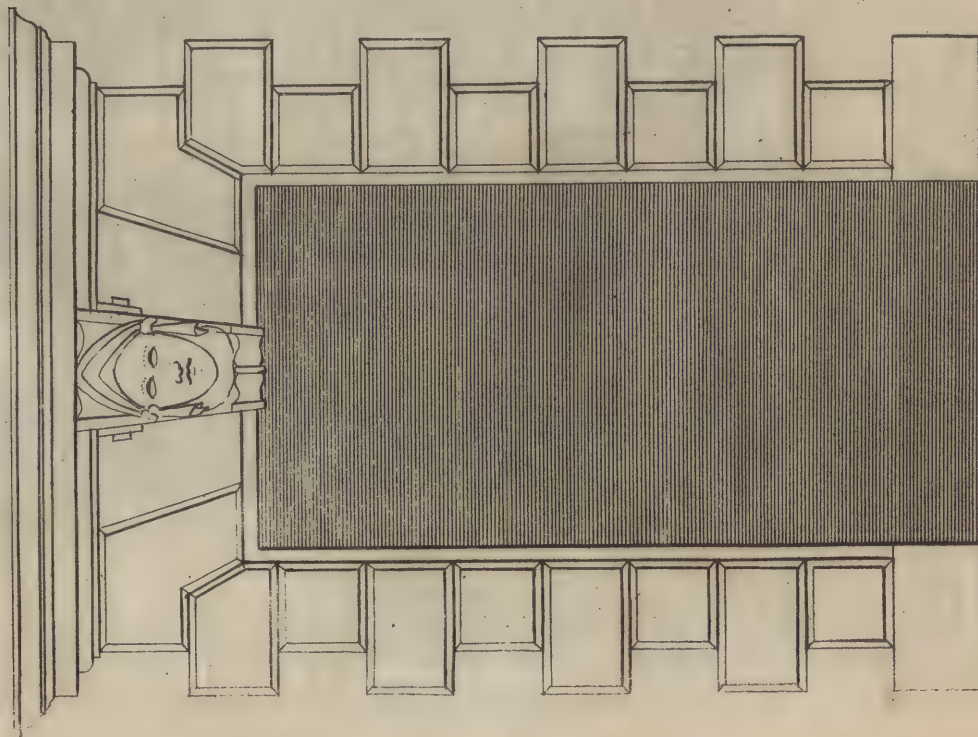
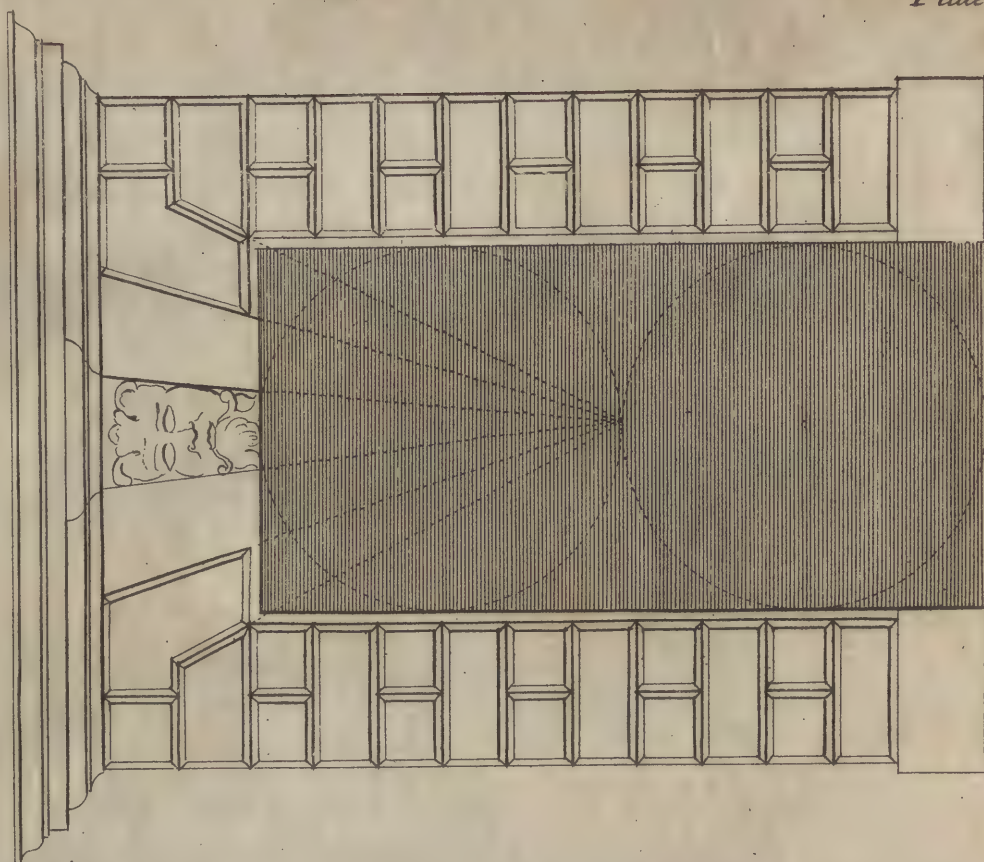




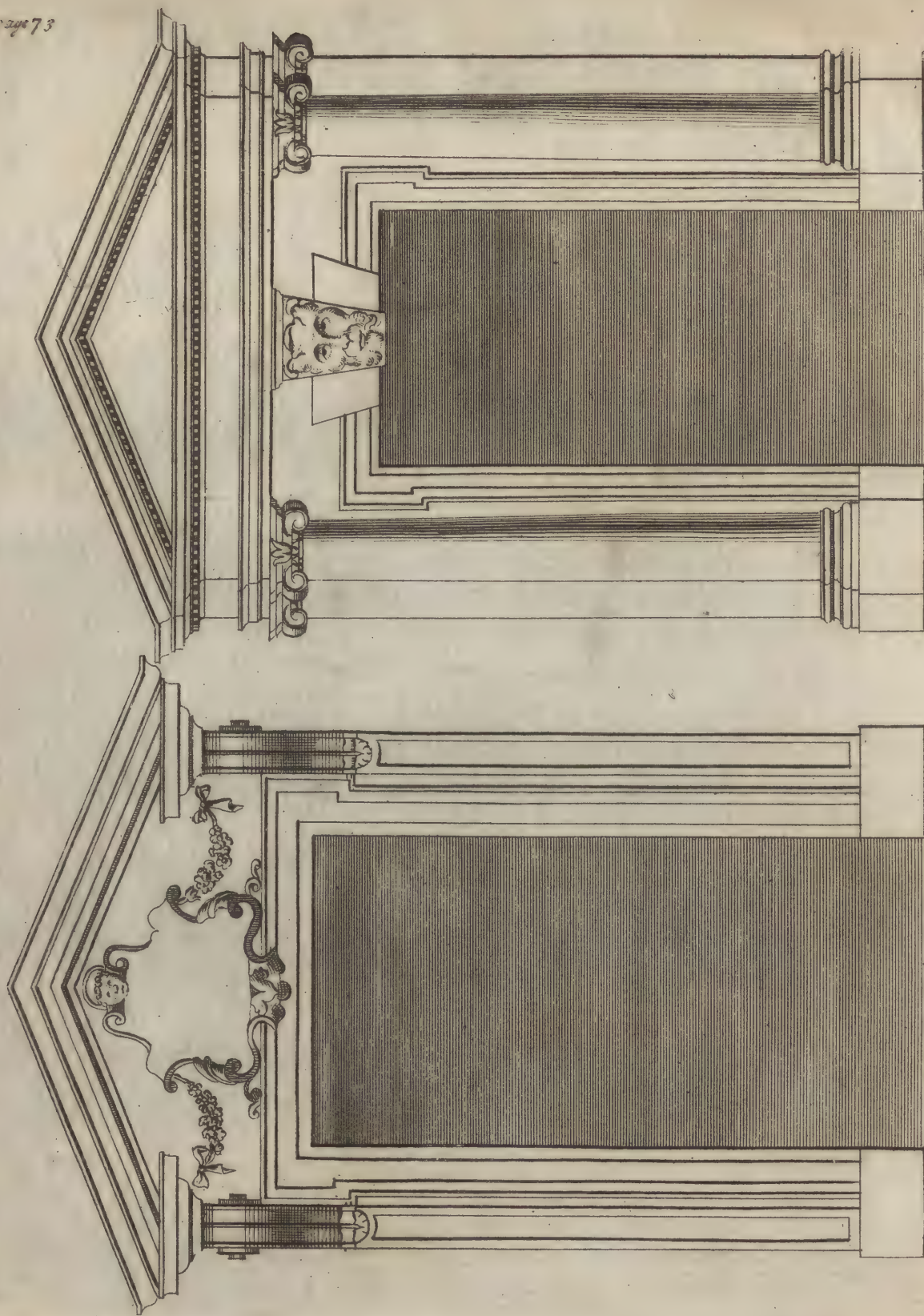














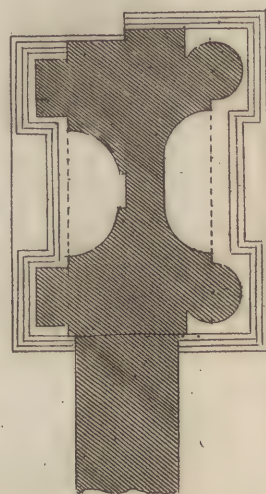
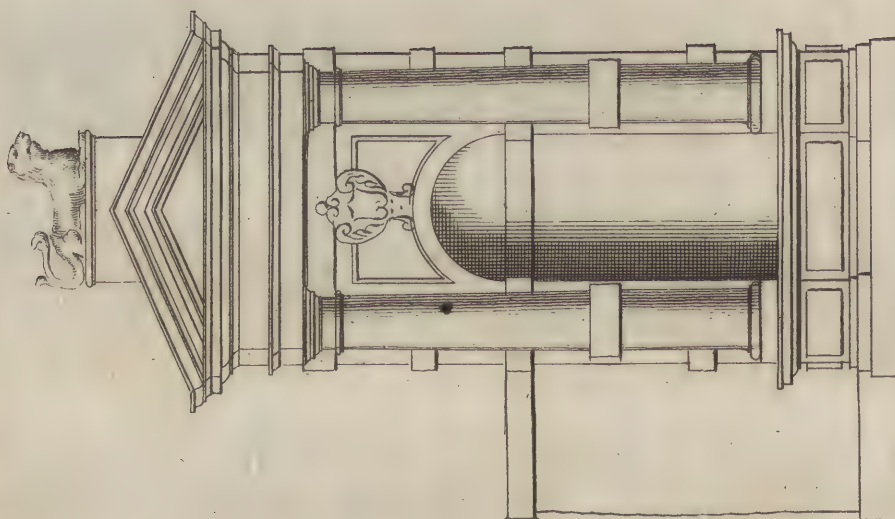
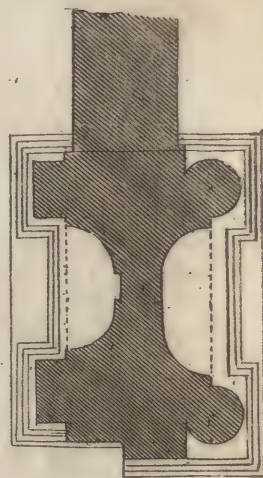
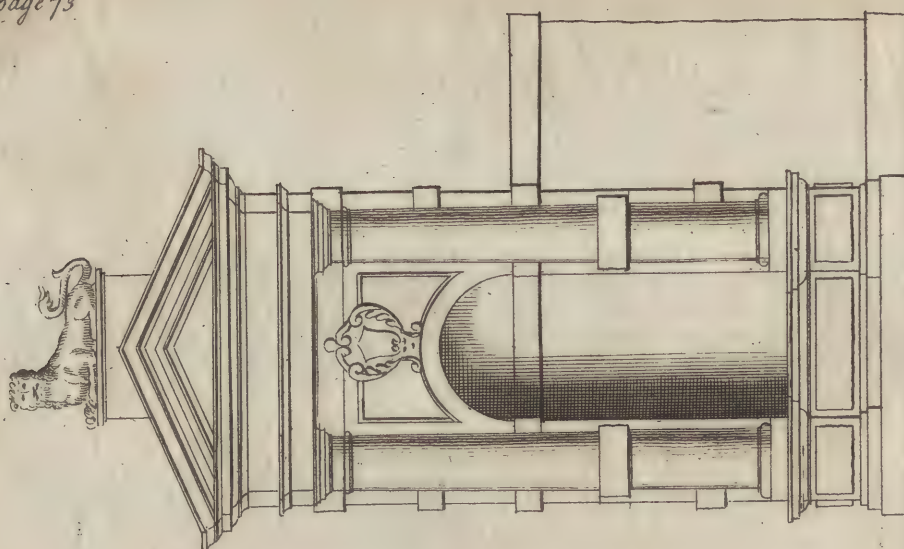


Plate XXXVII.

Here are also four different Designs, two of arched Doors or Gates, and two of square Heads ; two of them are of the *Corinthian* Order, and two of the *Composite*.

They are all figured for the Proportions, so that by a due Inspection no more need be said of them.

Plate XXXVIII.

Contains two Rustic Doors ; the Openings of each are two Diameters, and are ornamented with carved Key-Stones, and have the *Tuscan* Cornice.

Plate XXXIX.

Two other Designs for Doors. The first of them hath Consoles, or Trusses, over open Pilasters ; and the level Cornice is broken, or interrupted, to make Way for a Shield, and Festoons, and other Ornaments.

The other is of the *Ionic* Order, with three quarter Columns and Pilasters on the Sides, as before, with the Addition of a triple Key-Stone ornamented.

Plate XL.

On this Plate are two Grand Piers for Gates, with Columns, Pilasters, and Niches ; the Opening, or Space between them, is equal to twice the Breadth of the said Piers.

Plate XLI.

Is two other Piers, adorned with Rustics and Niches ; the Distance is as the other.



For the well-proportioning the Windows, Regard must be had to the various Altitudes of each Story in the House, &c. Therefore on Plate XLII.

YOU have six differing Designs and Proportions, some of which will be suitable to the Height of any Room.

No. 1. Is a Round Window.

No. 2. Is a Perfect Square.

No. 3. The Height is the Diagonal of a Square.

No. 4. The Height is a Square and two-thirds.

No. 5. The Height is a Square and three-fourths. And,

No. 6. Is two Squares.

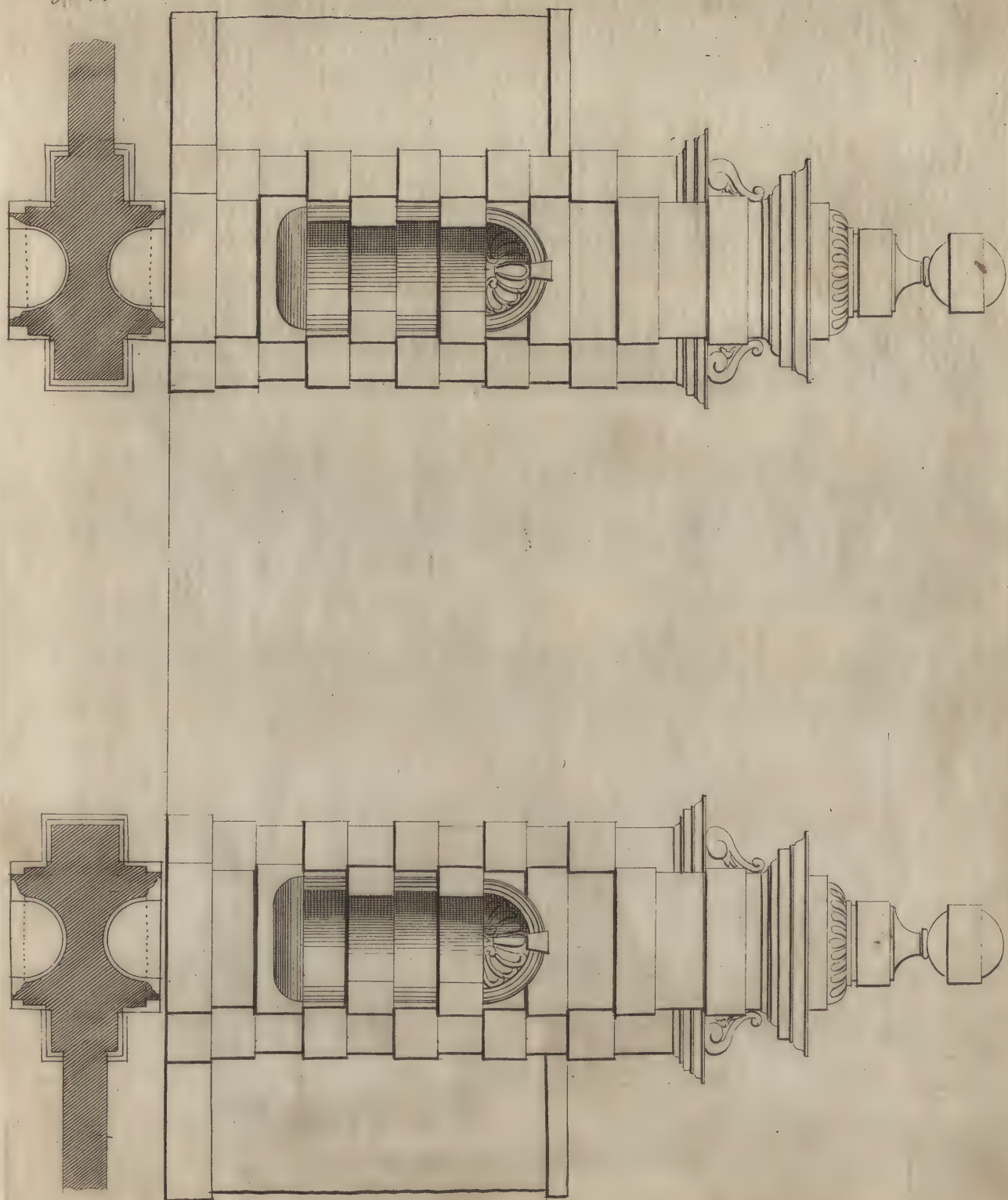
All which is plain by the dotted Lines.

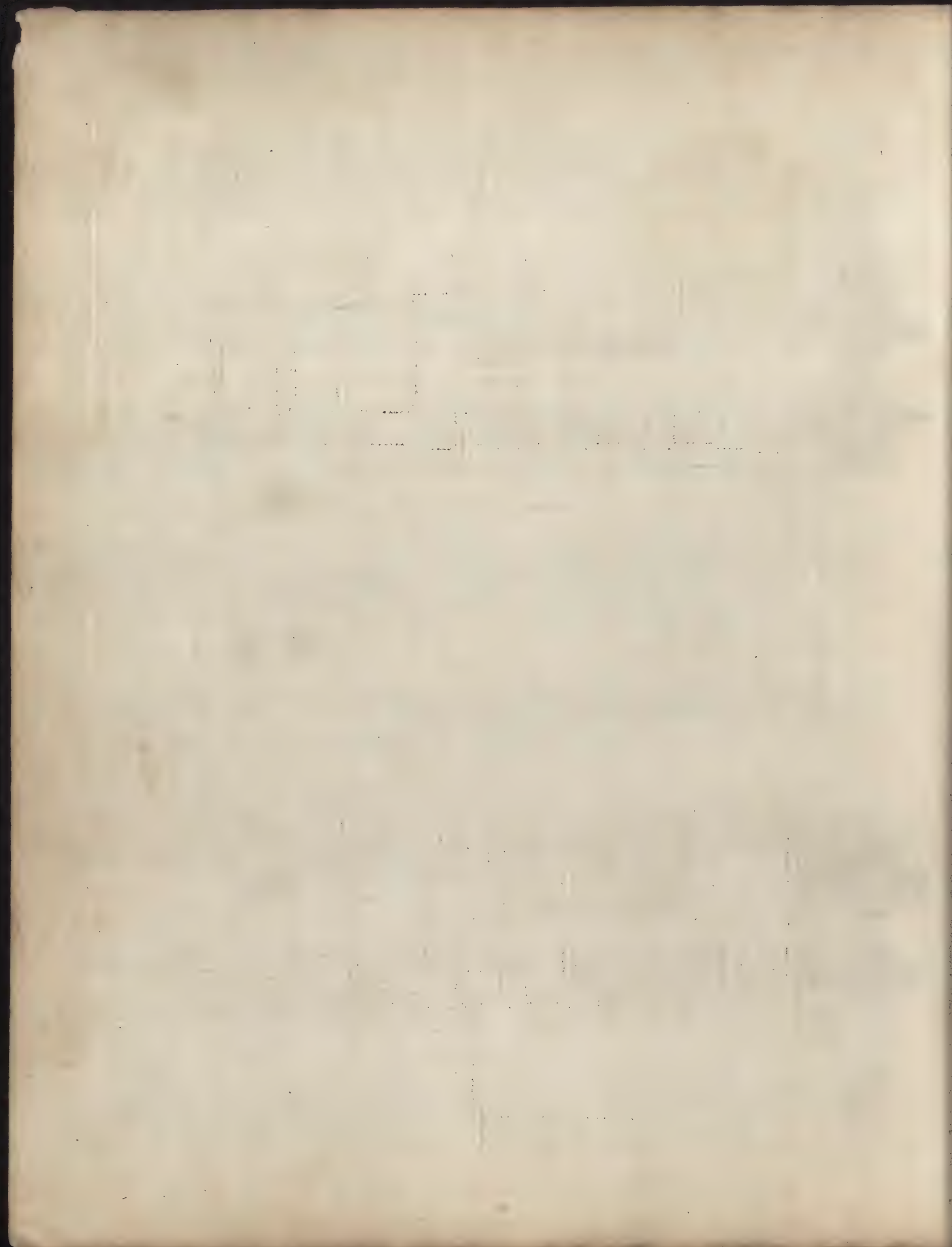
The Architraves to each of them are in general one-sixth of the Breadth.

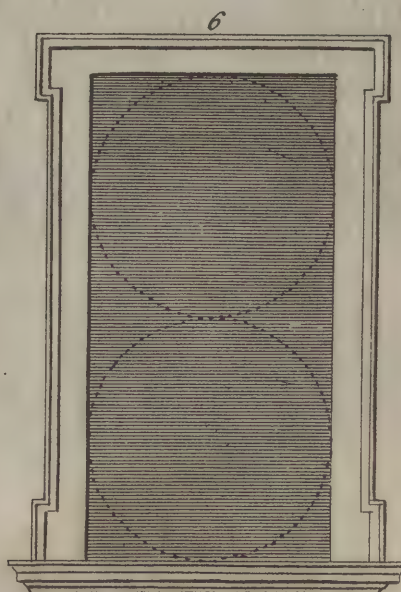
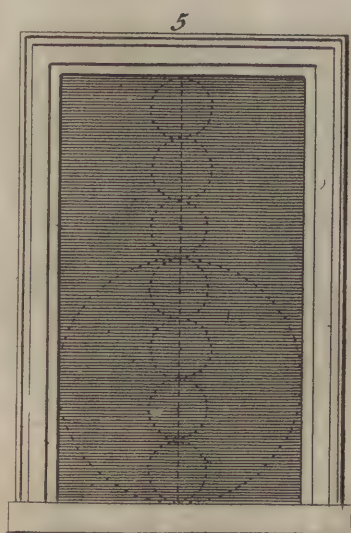
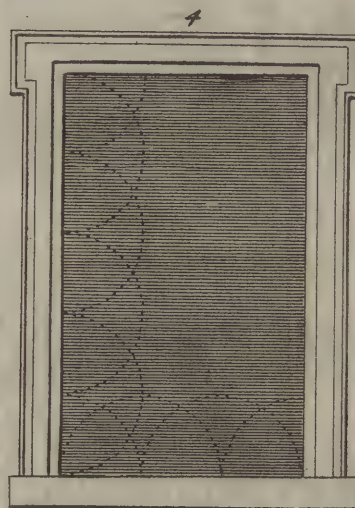
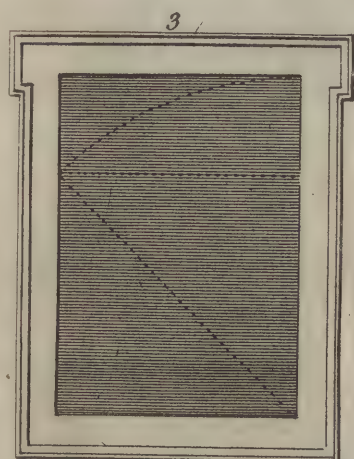
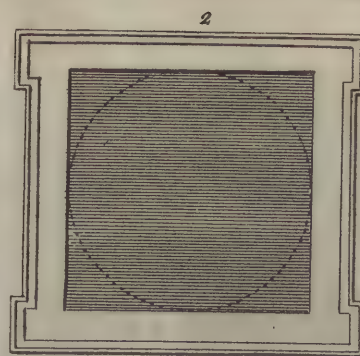
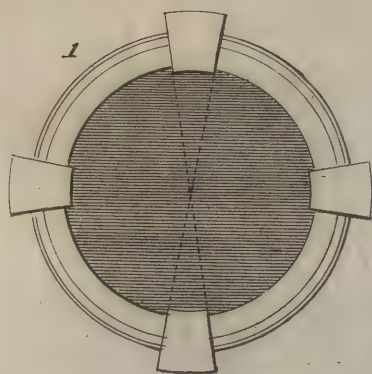
Plate XLIII.

Is four more different Designs and Ornaments ; the Proportion of them all is two Diameters and one-sixth of the Opening, two of them standing on Pedestals.

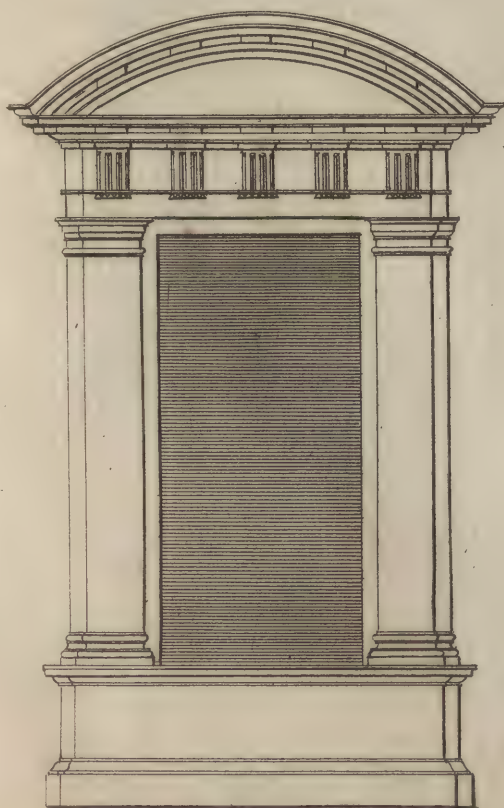
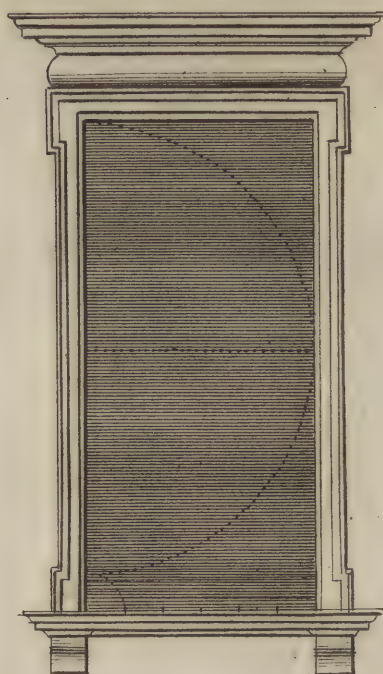
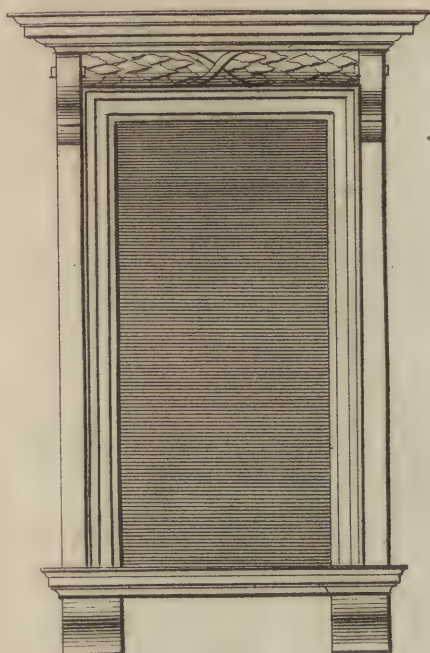
Plate

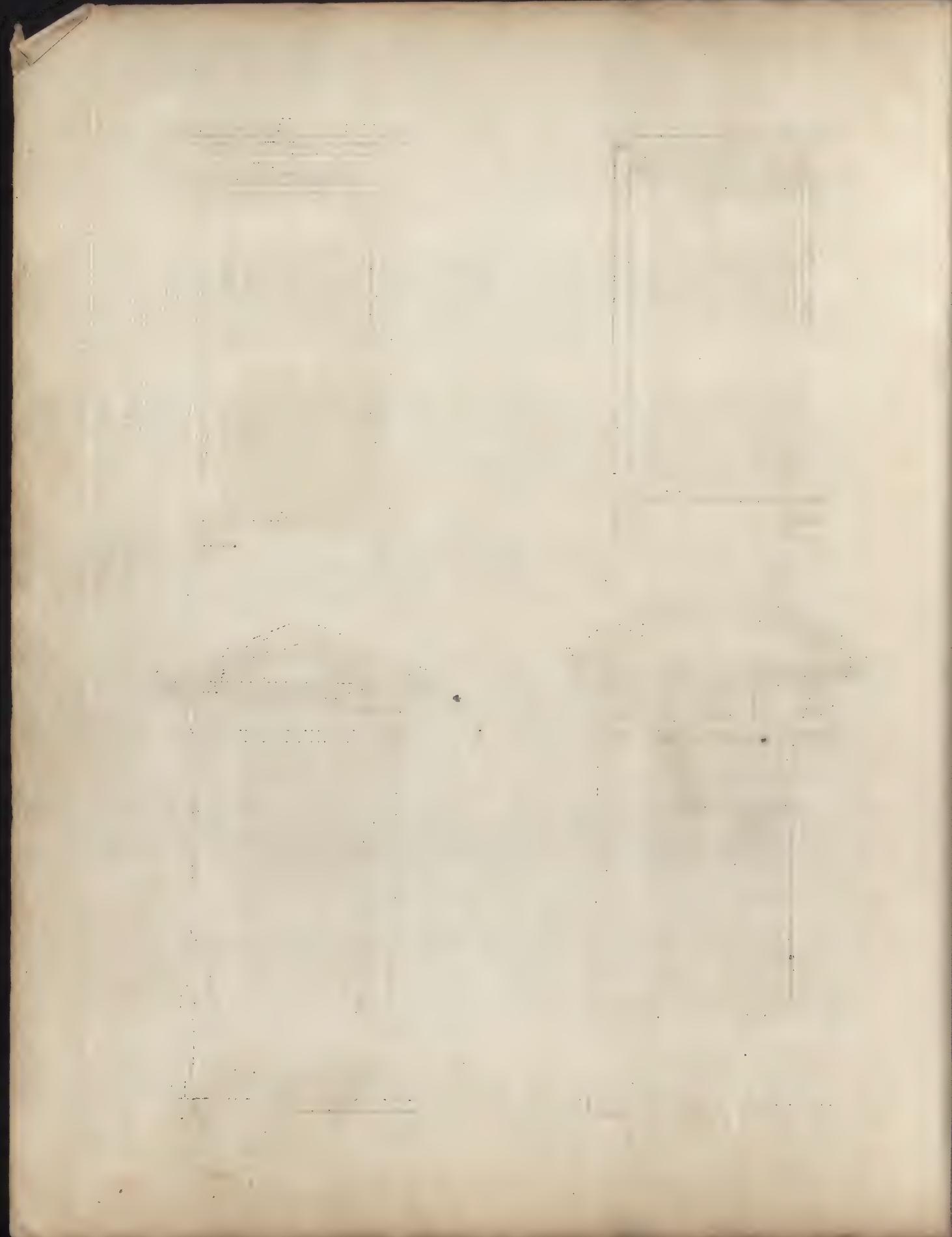




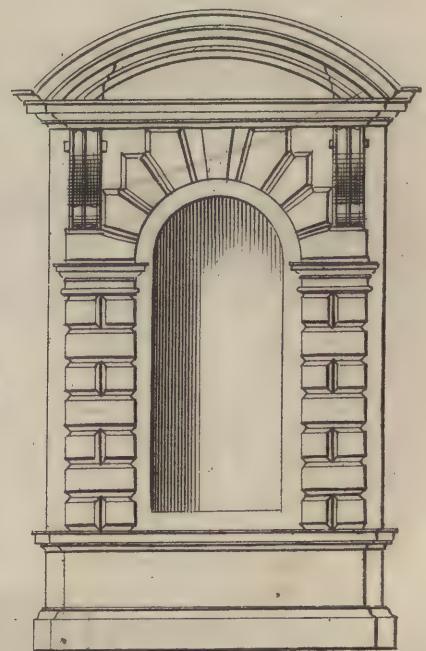
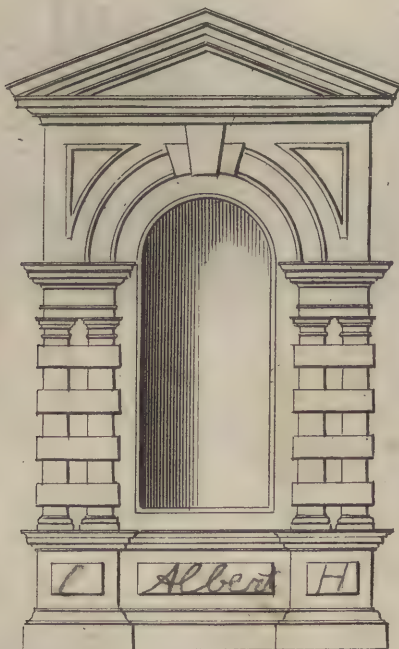
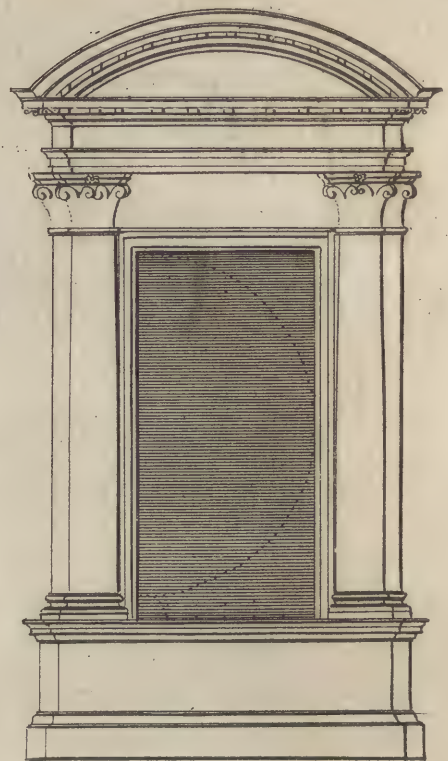
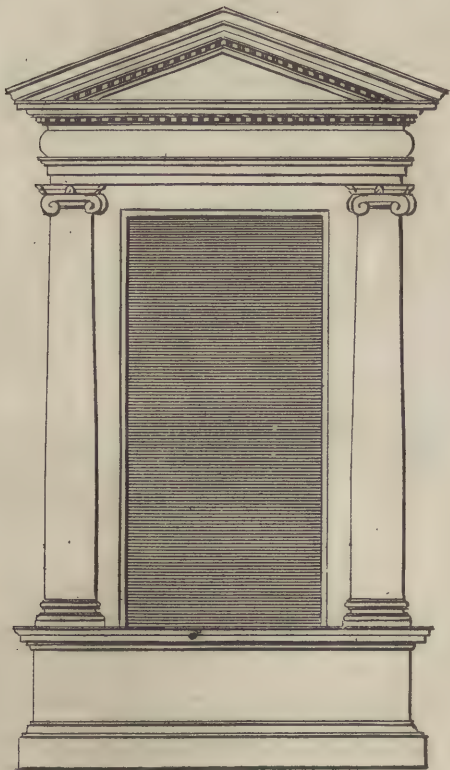






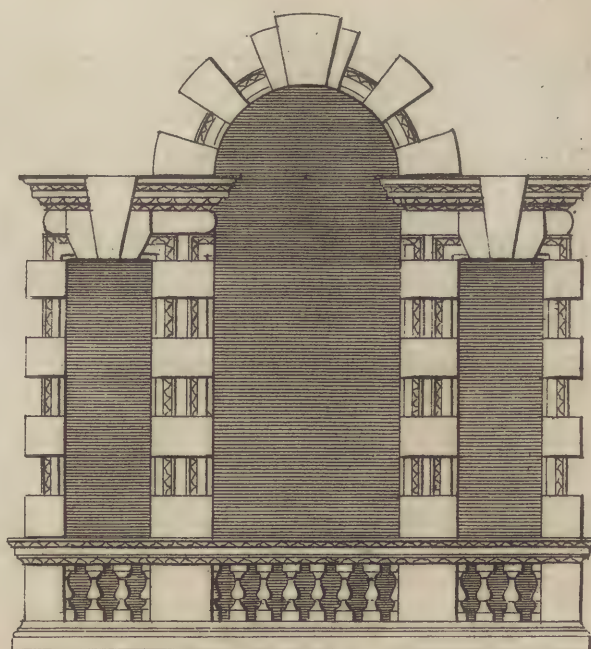
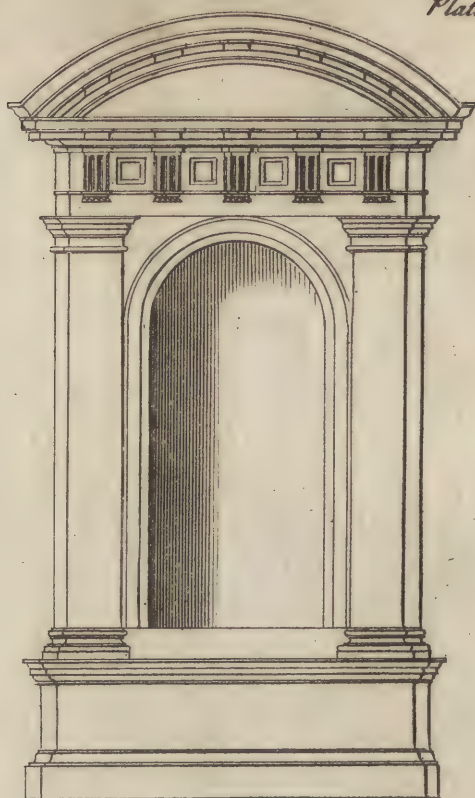
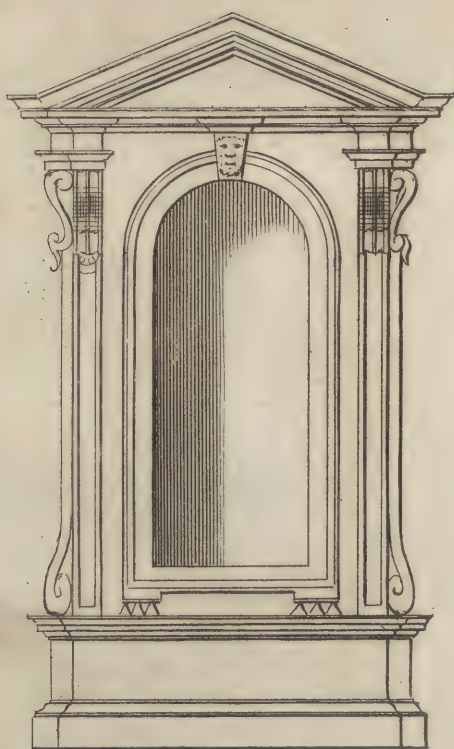






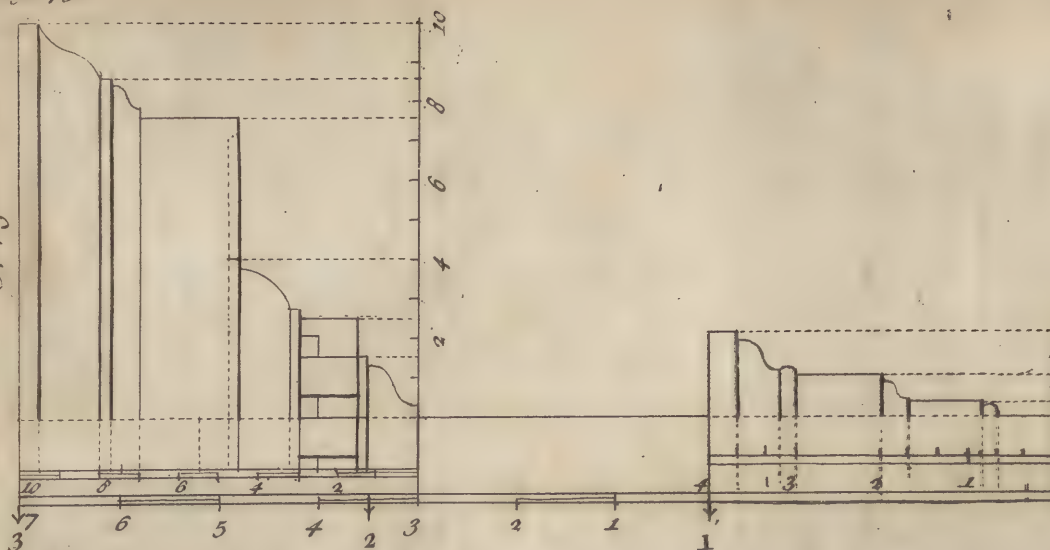
V. 28



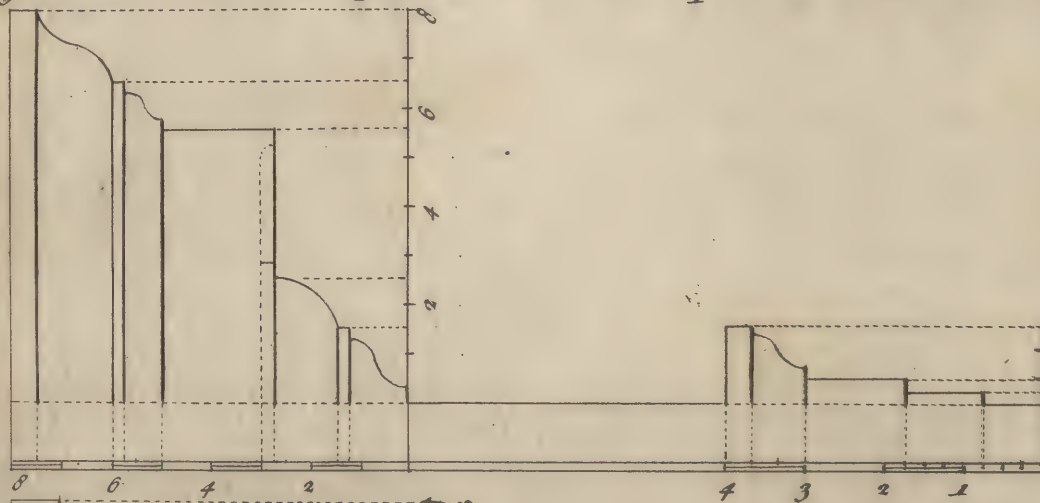




N^o 3



N^o 2



N^o 1

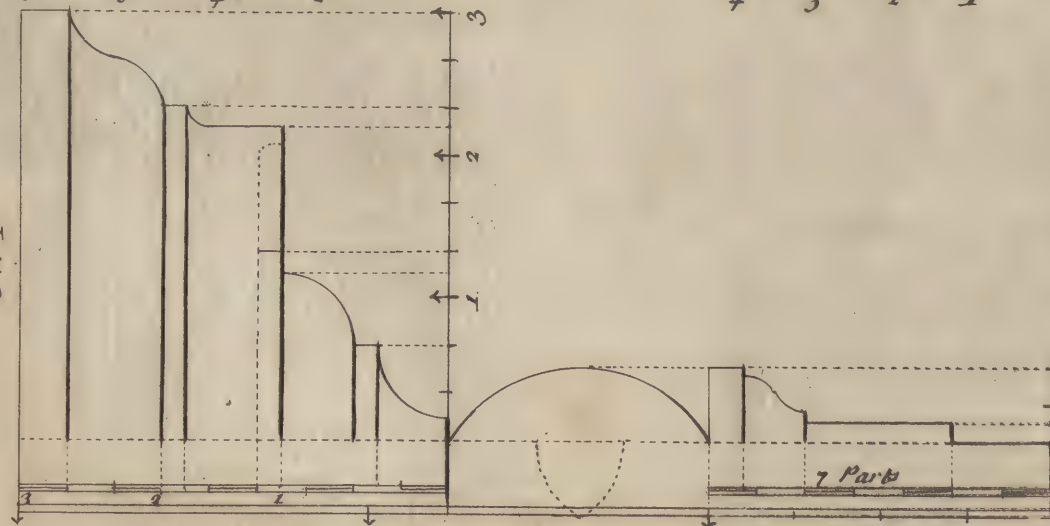


Plate XLIV.

At Top are two more different Windows; though the Opening hath the same Proportion, they are dressed with the *Ionic* and *Corinthian* Orders.

At Bottom are two Designs for Niches, adorned with Rustics, &c. on Pedestals.

Plate XLV.

On the Top are two more Niches, on Pedestals, differently dressed; and at the Bottom two *Venetian* Windows. That on the Left Hand is of the *Ionic* Order; the Side-openings are each equal to one-third of the Middle-opening, which is two Diameters to the Semicircle. That on the Right Hand is a Rustic one; the Side-openings being each equal to one-half the Diameter or Middle-opening.



Plate XLVI.

HAVING given a large Variety of Doors, Windows, and Niches in general, on this Plate you have the particular Measures of the Architrave, Freeze, and Cornice.

The General Rule is, to be guided by the Breadth of the Architrave, whose best Proportion is one-sixth of the Breadth

of the Opening (as given before) but ought never to be less than that, nor more than one-fifth.

These three are not only different in the several Members, but in the general Proportion, and yet formed from the Architrave.

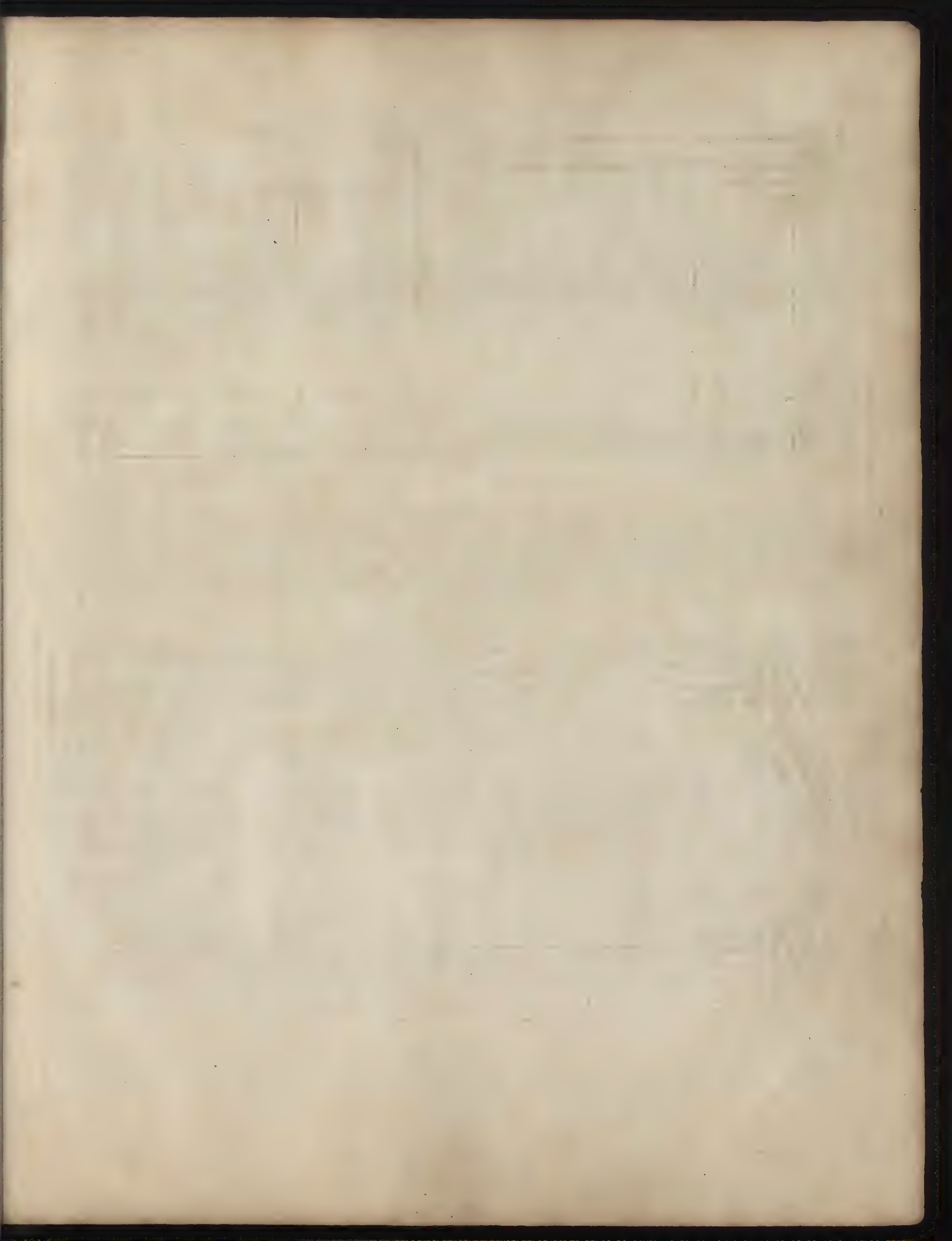
No. 1. Is of a *Tuscan* Kind ; the Breadth of the Architrave being divided into four Parts, three of such is the Height of the Freeze, and five of such the Height of the Cornice.

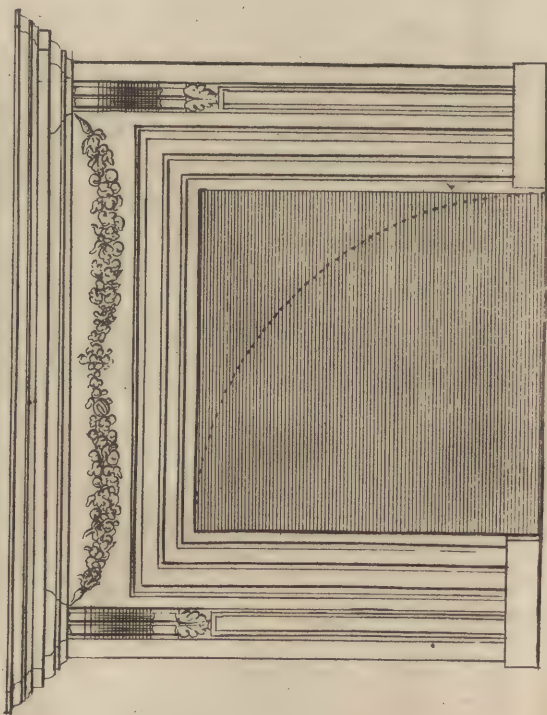
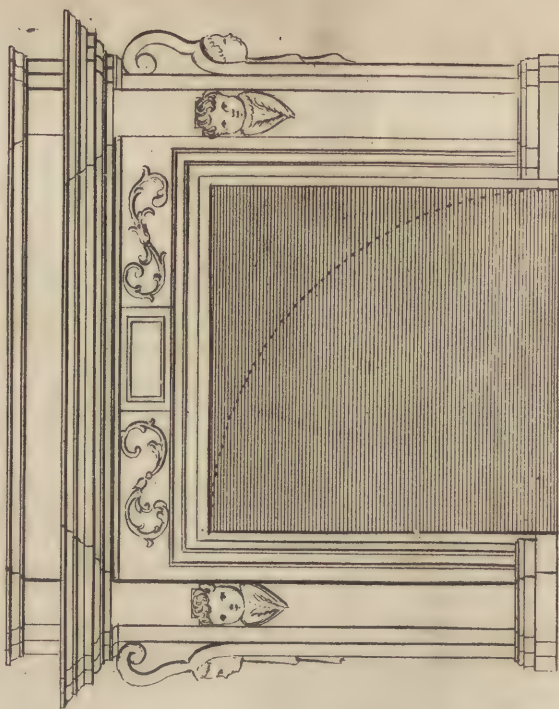
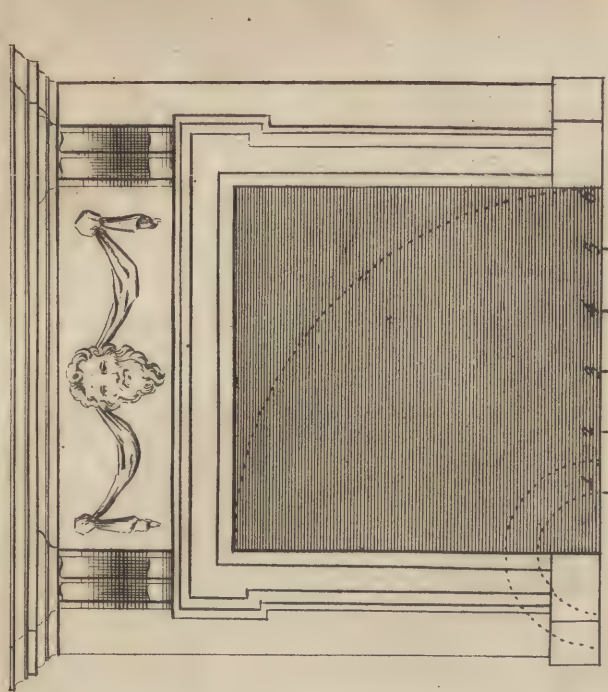
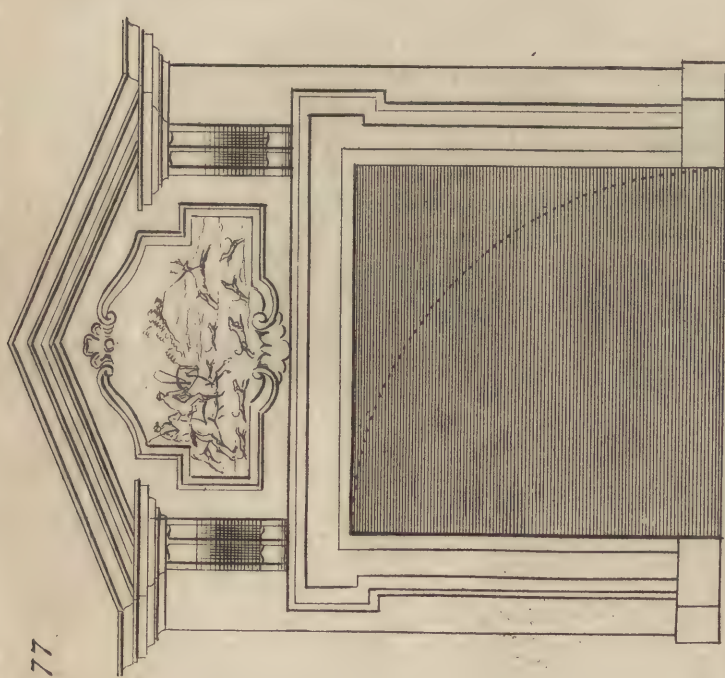
No. 2. The Freeze is made equal to the Architrave, and that being divided into four Parts, five such is the Height of the Cornice, or (which is the same Thing) if a Height were given and divided into thirteen Parts, the Architrave hath four, the Freeze four, and the Cornice five.

No. 3. Is different still ; if a Height be given, divide it into three, one is the Architrave, and the other two divide into seven, giving three to the Freeze, and four to the Cornice ; or the Architrave being given, divide double the Breadth into seven, &c. will be the same Thing.

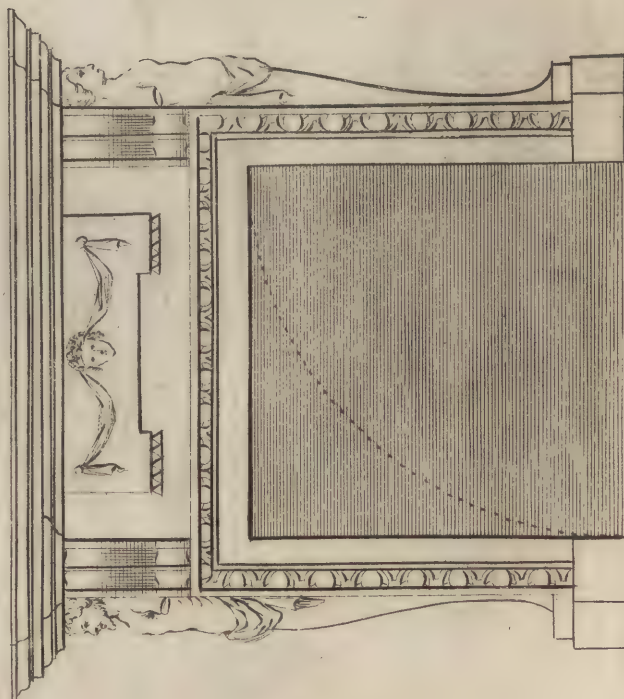
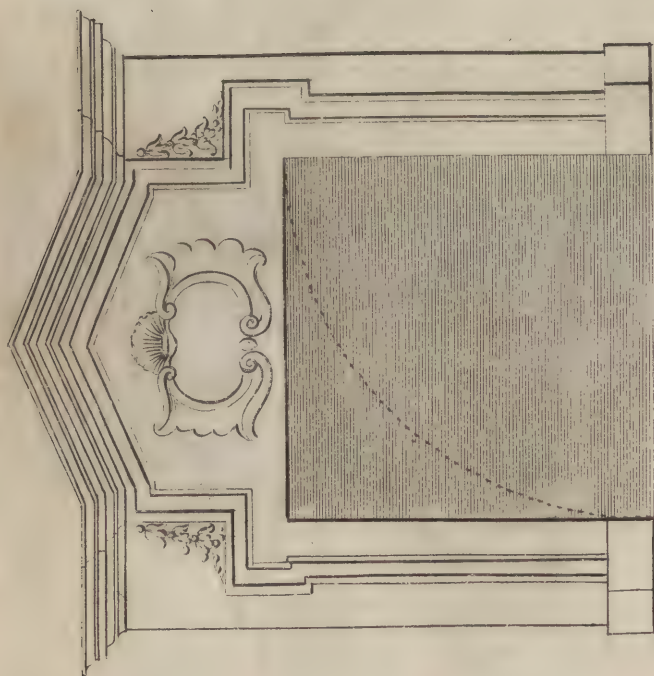
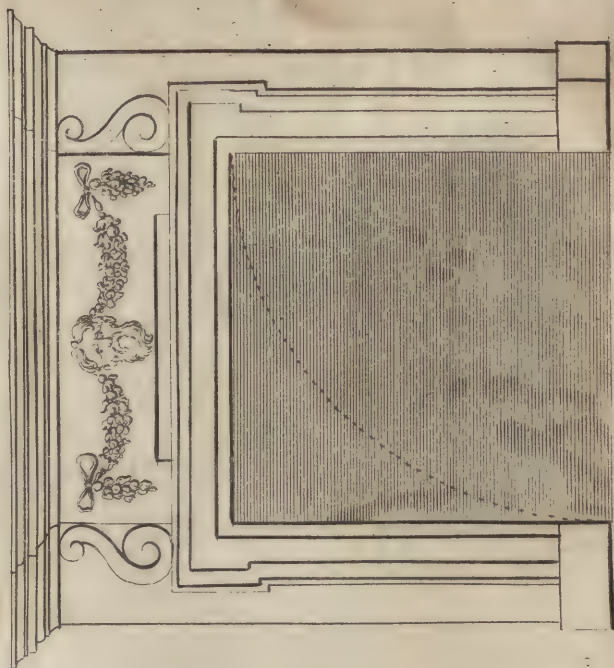
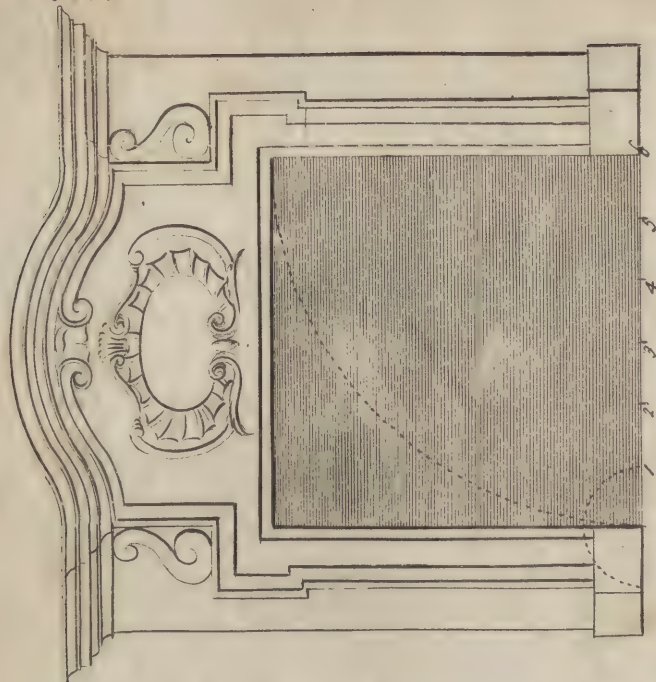
Hereby, this Proportion will form the Architrave the Height of that in No. 1. and the Cornice, the Height of that in No. 2. as appears by compare.

As to the forming the several Members, they are so obvious by Inspection, and a right Knowledge of the former Rules, that it must be needless to mention them any more, the Scales and Figures being sufficiently plain.

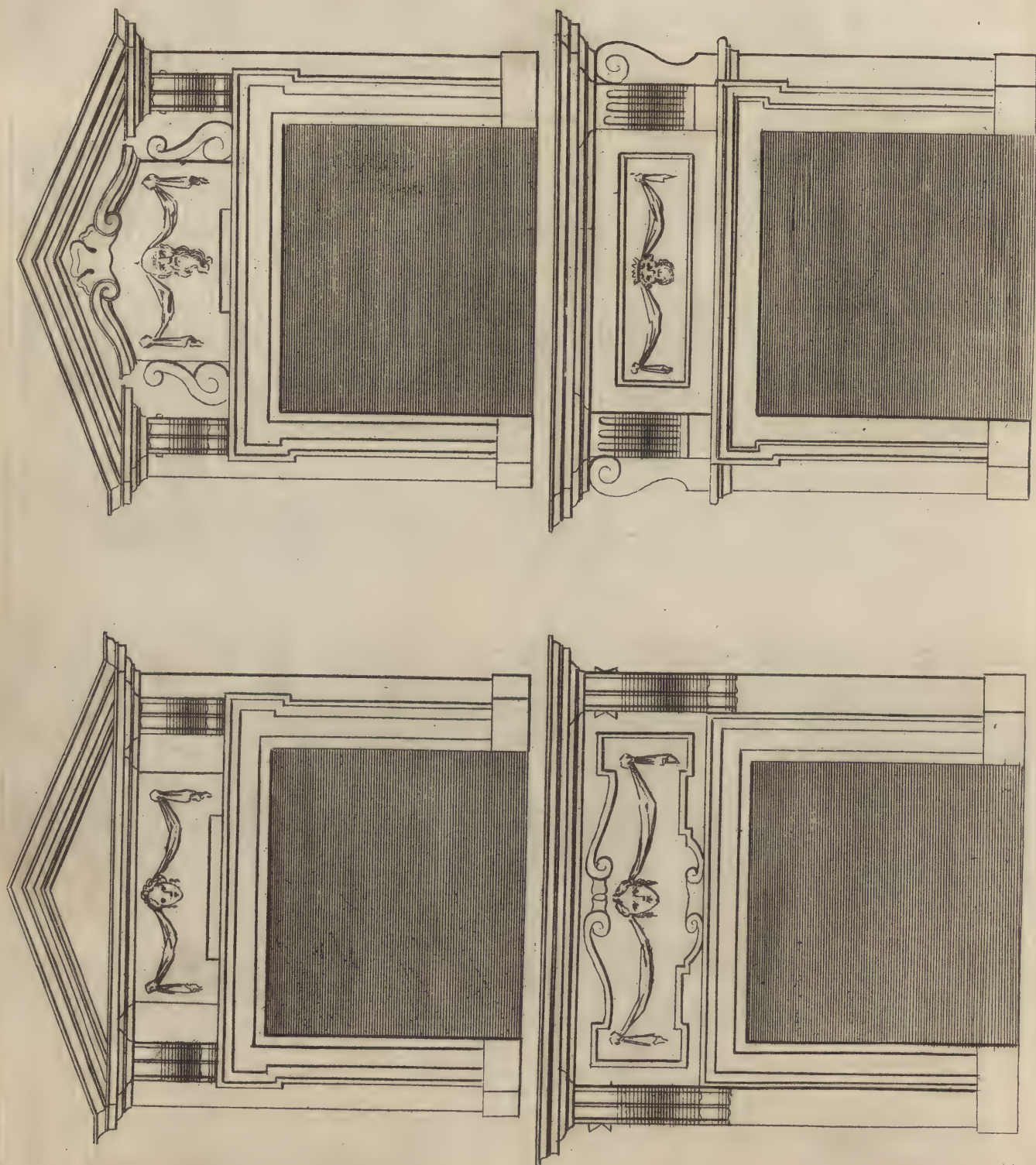




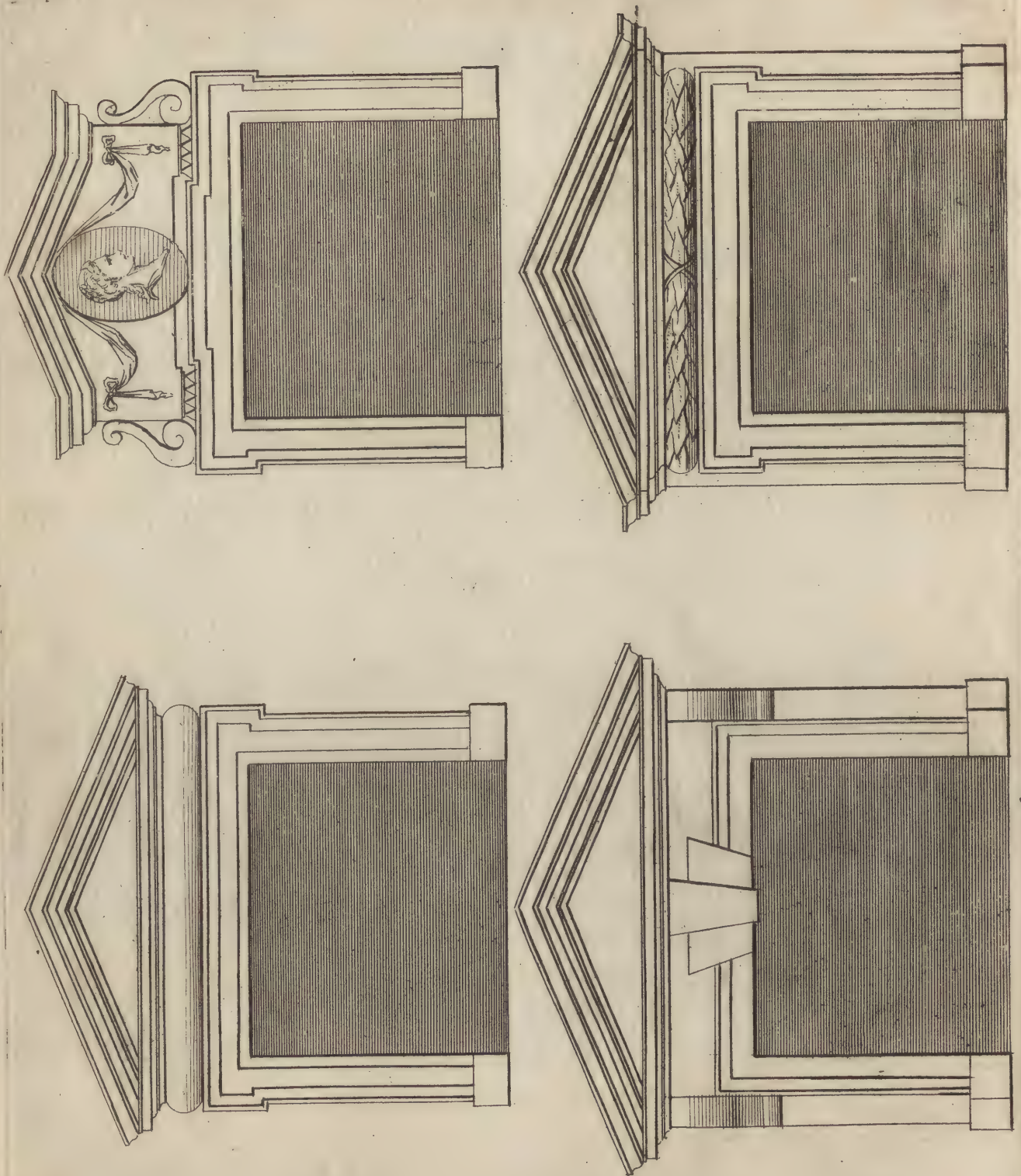




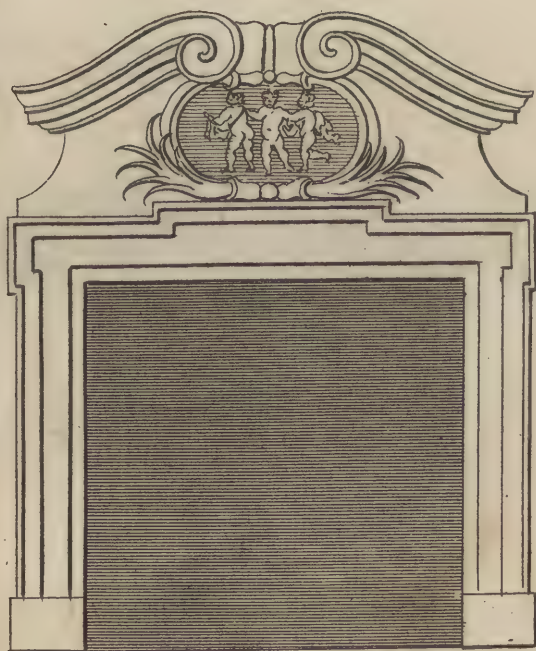
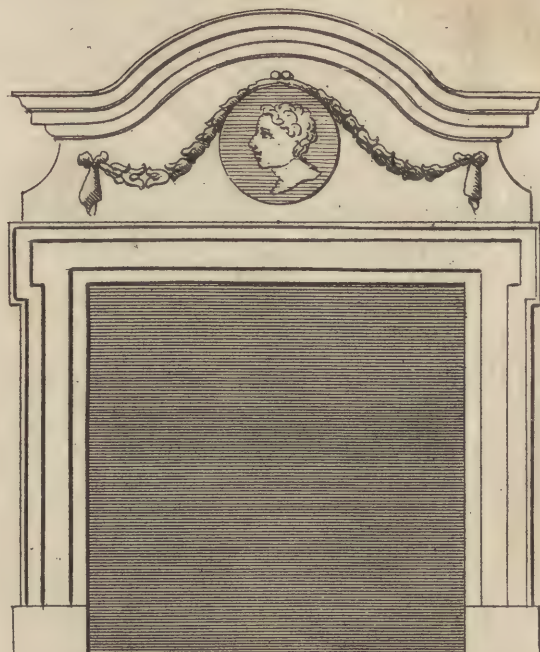




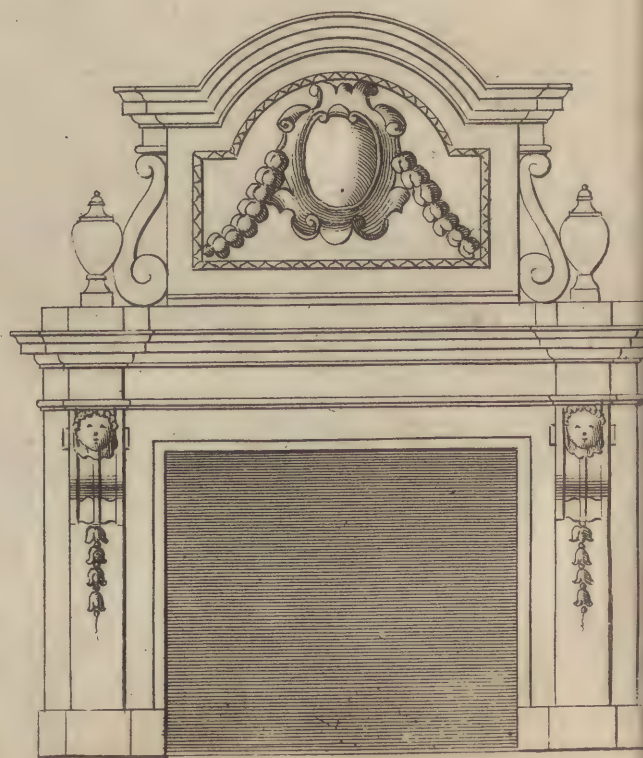
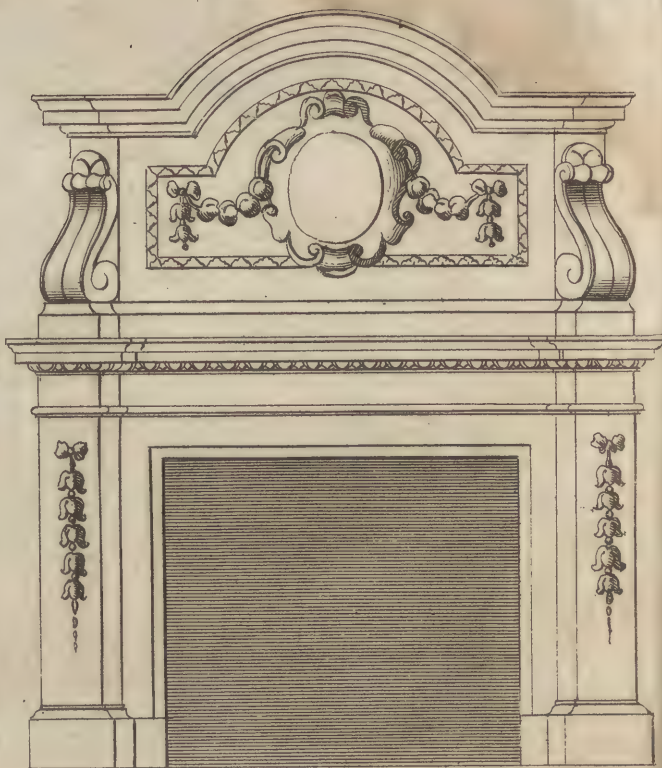




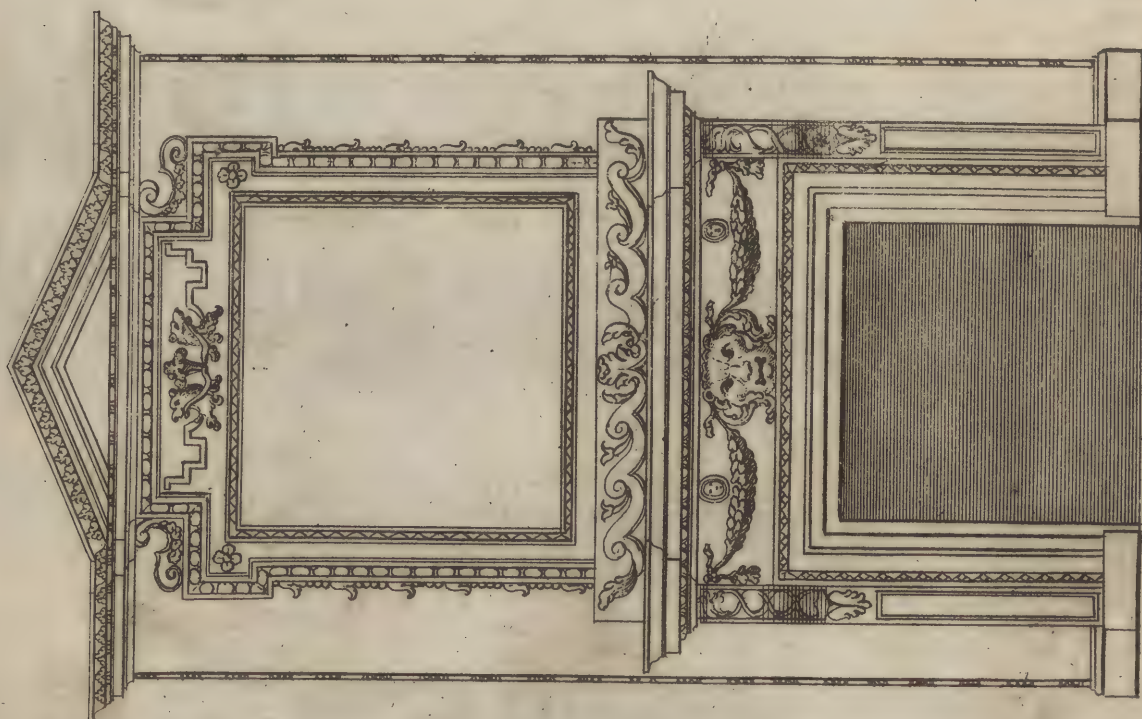
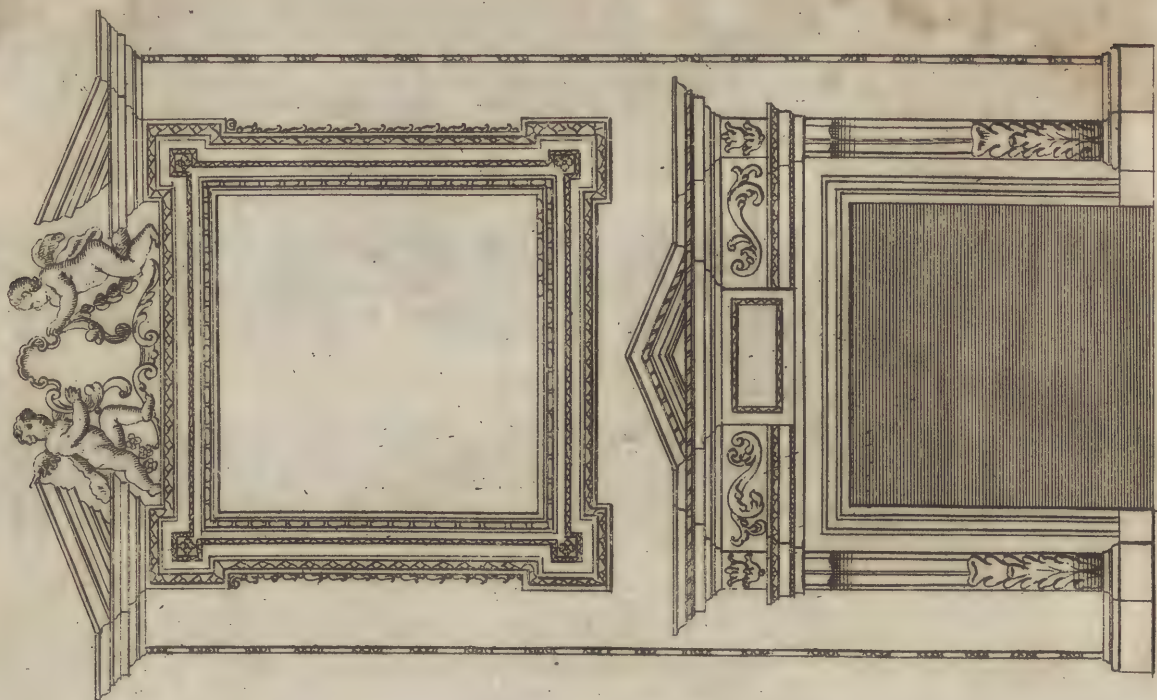




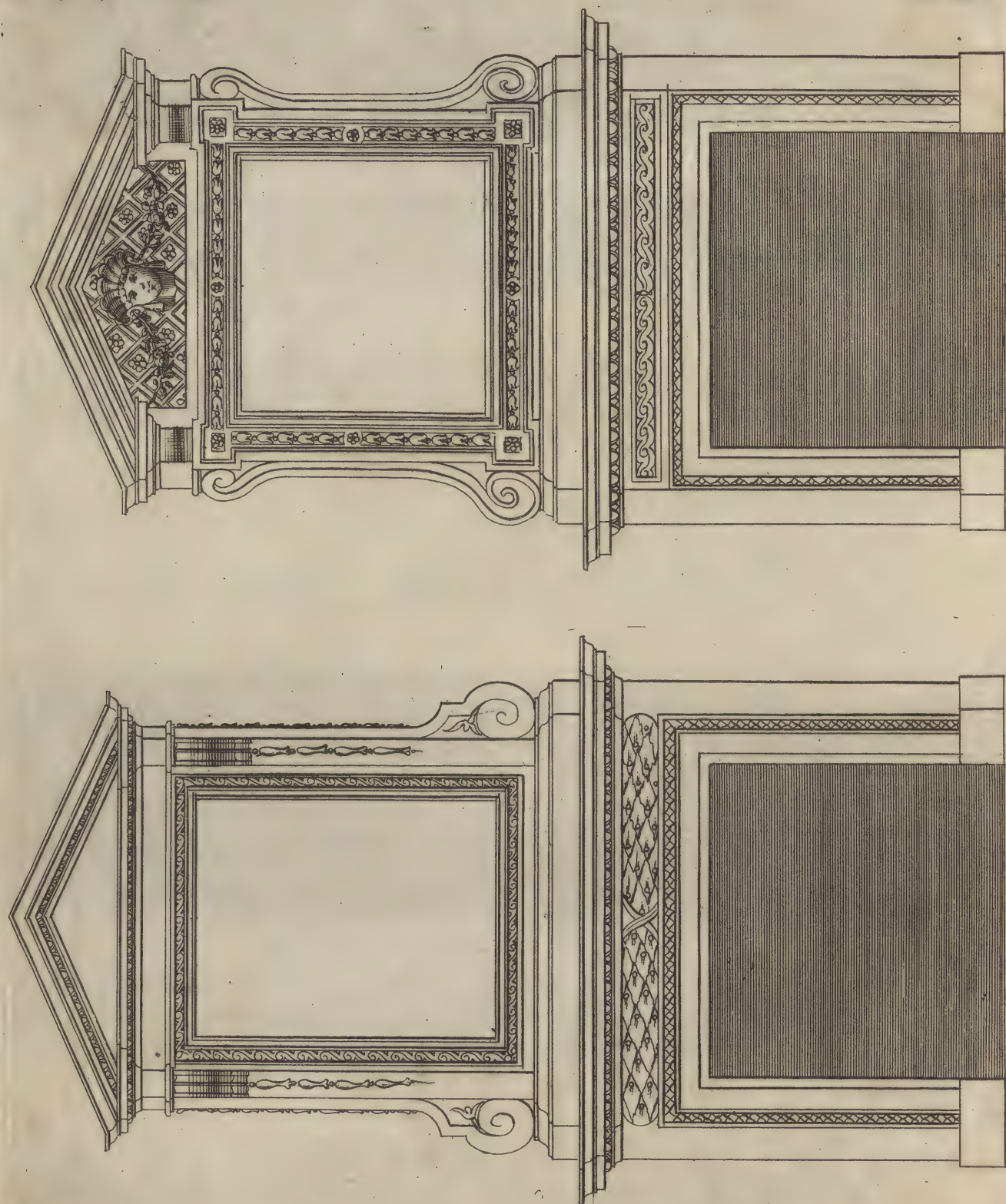


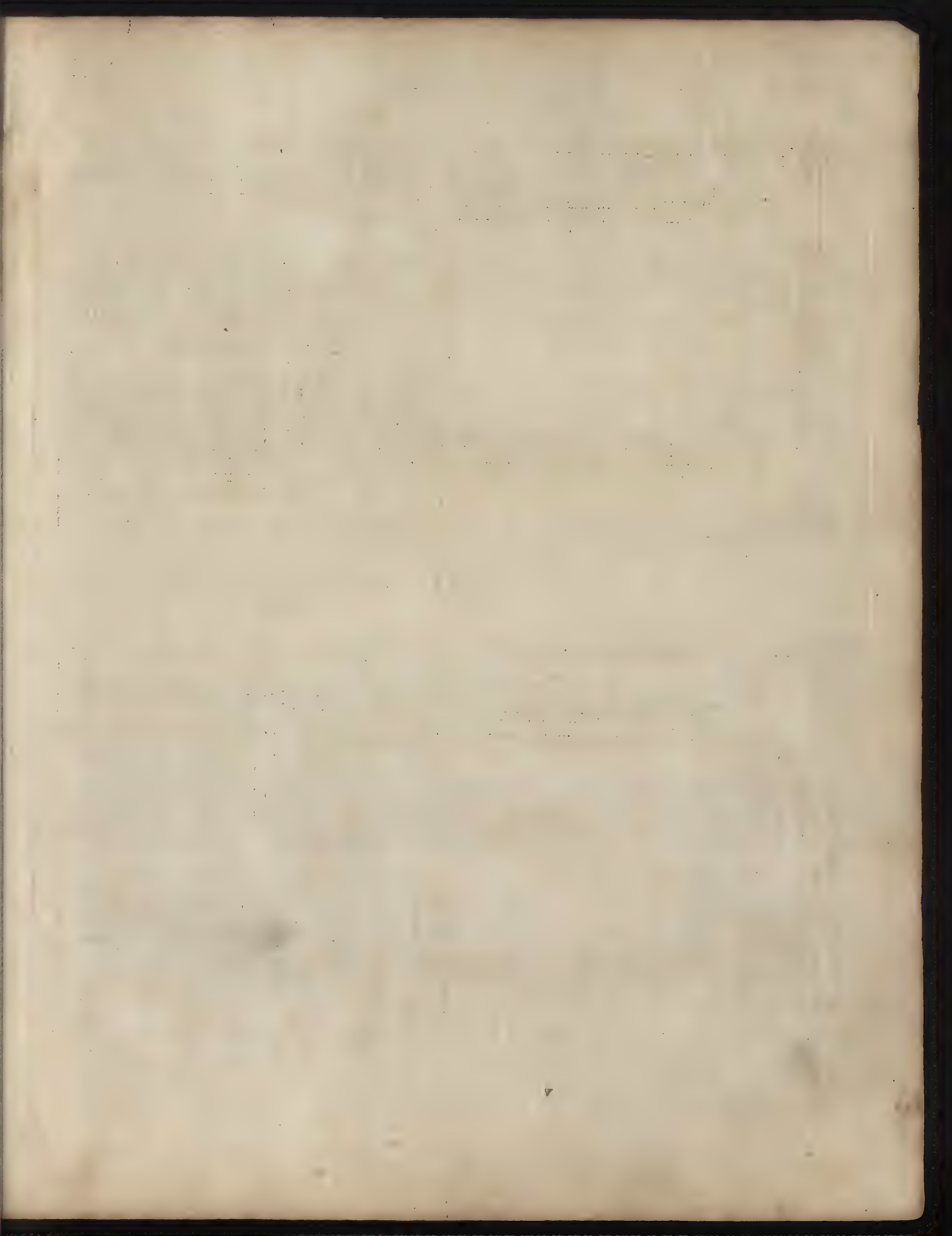


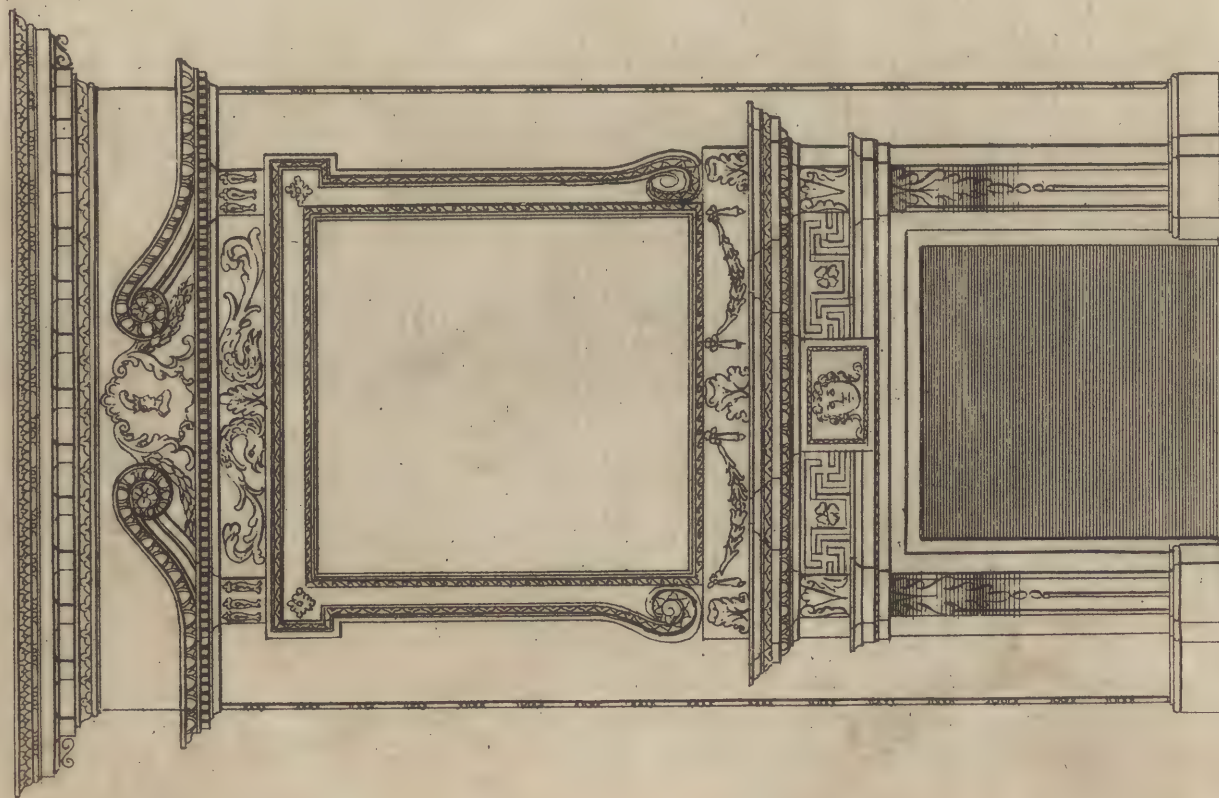
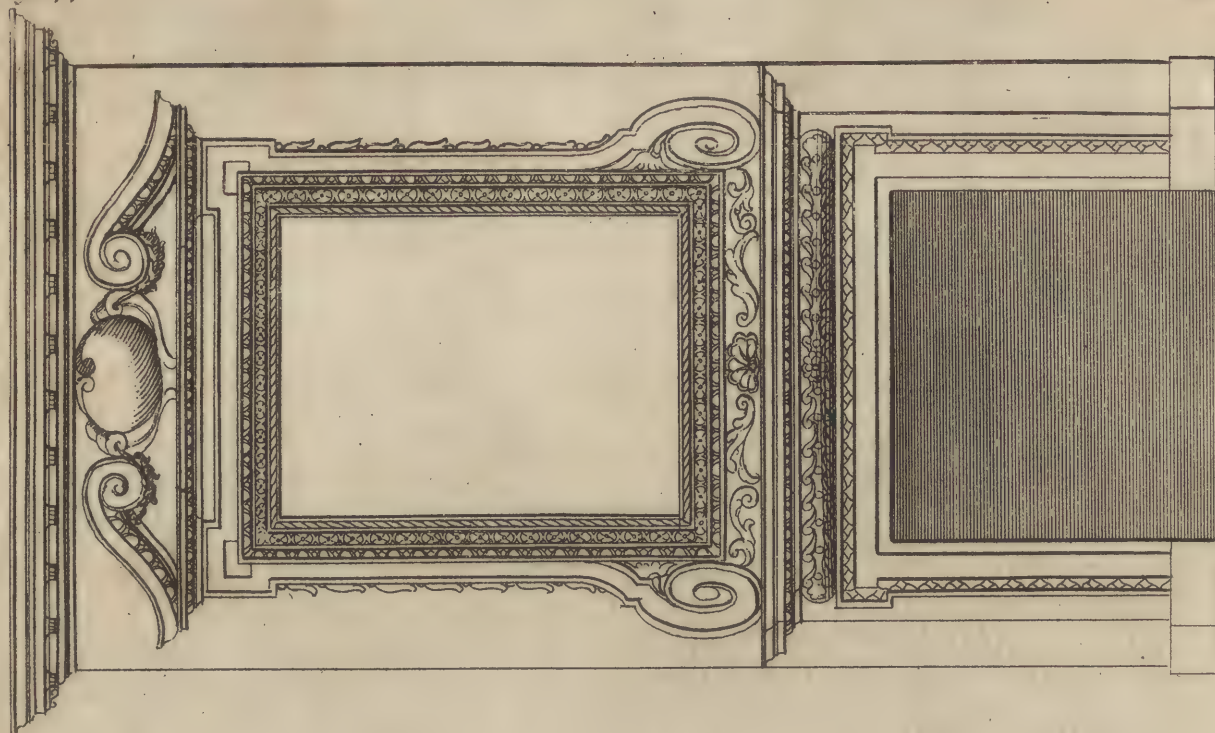




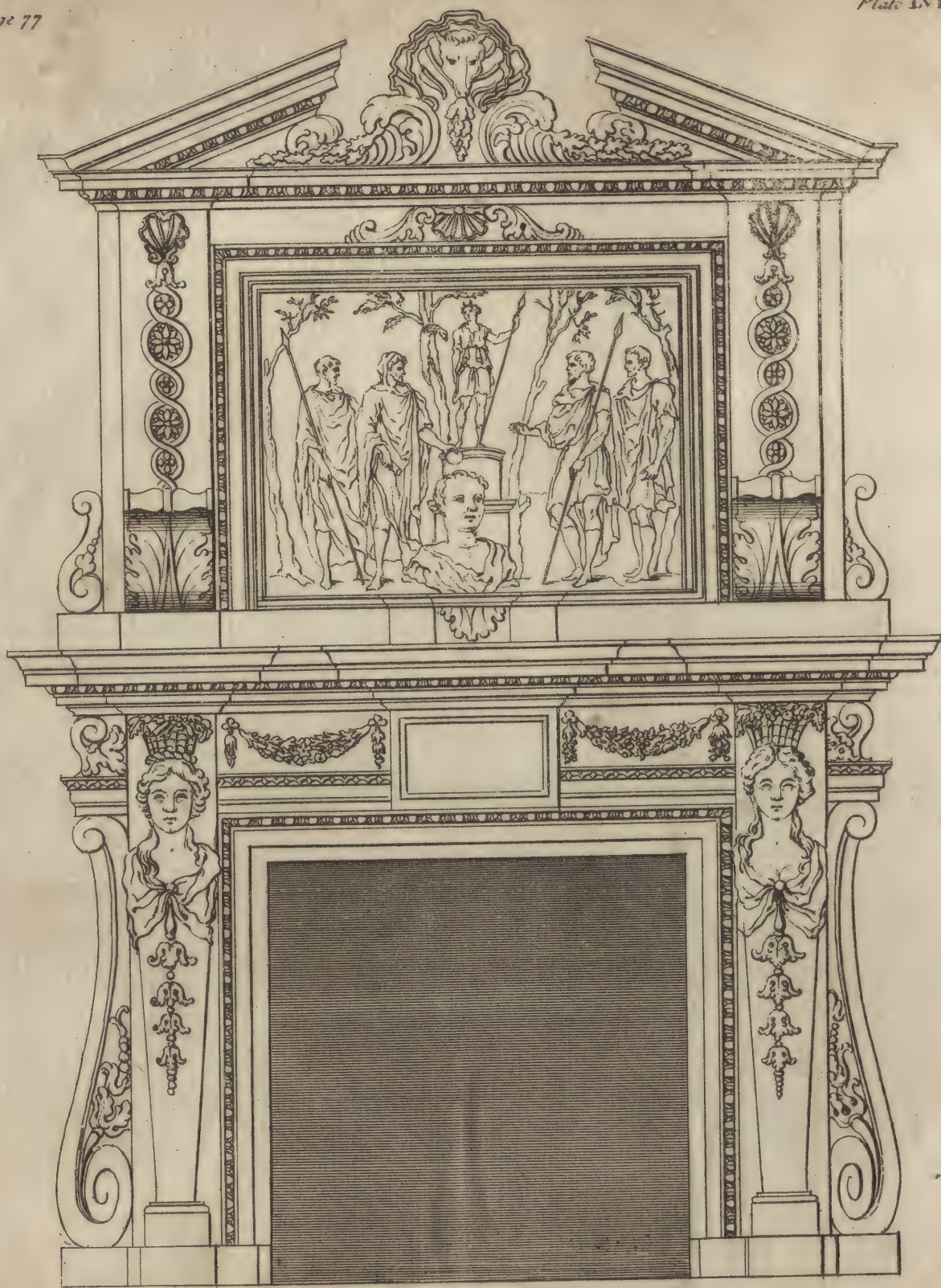




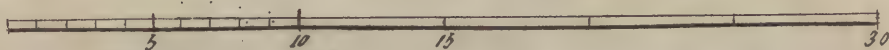
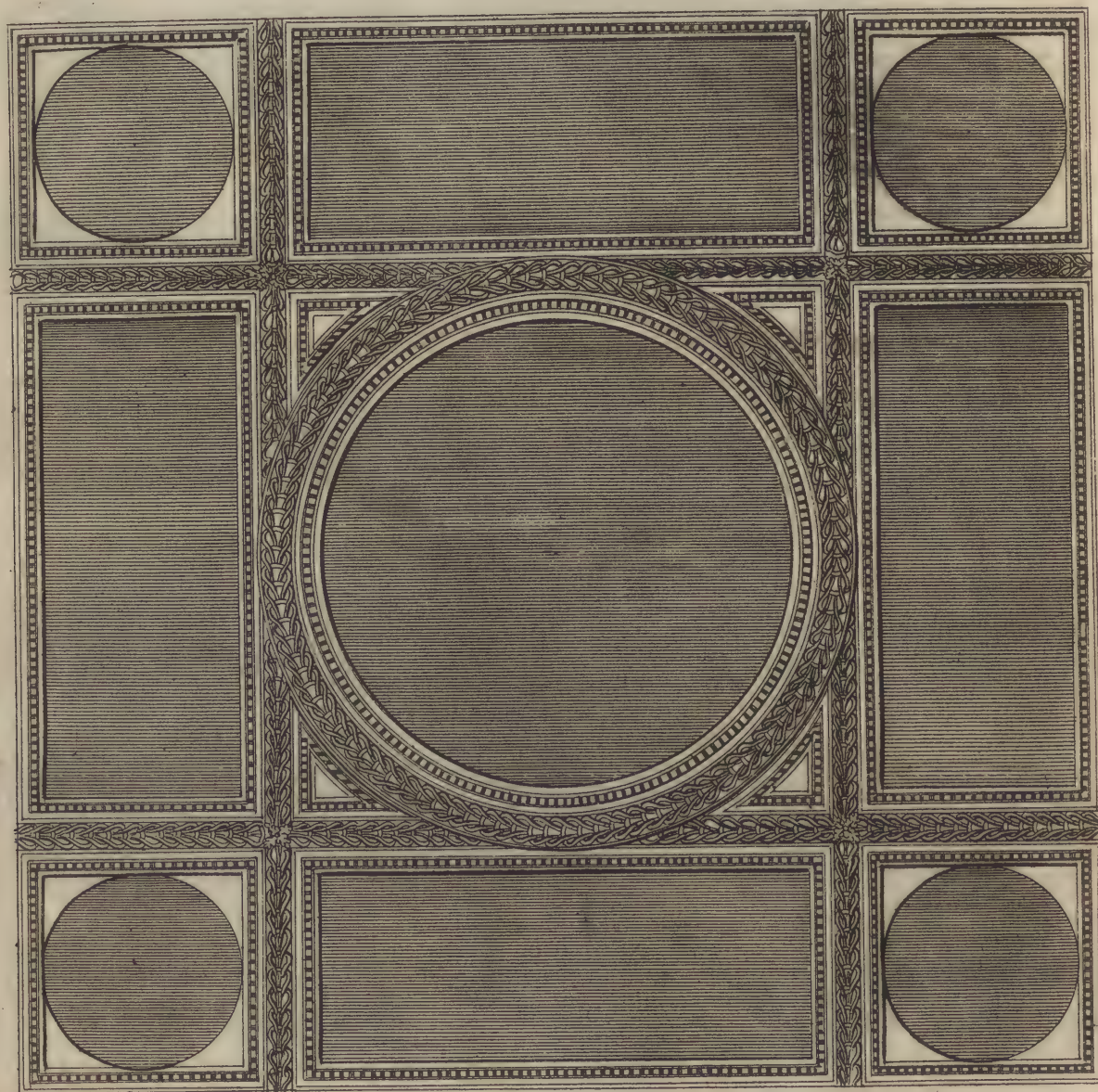














Of Chimney-Pieces. Plate XLVII.

THEY must be made larger or smaller, in Proportion to the Size of the Rooms were they are intended. On this Plate are four different Sorts; the Opening of them all is a perfect Square, and the Architrave is one-sixth of the Opening, and the Pilasters the Half thereof; all which is plain by the dotted Lines.

Plates XLVIII, XLIX, L, LI, LII.

Contain twenty different Sorts of Chimney-Pieces, with various and uncommon Ornaments.

Plate LIII, LIV, LV.

On these are six different Manners of forming Chimney-Pieces, with Frames for Pictures over them, which are exceeding rich and ornamental.

Plate LVI.

Is an exceeding grand Chimney-Piece, designed by Mr. *Kent*, and executed at Sir *Robert Walpole's*, at *Houghton* in *Norfolk*.

Plate

Plate LVII.

In this Plate there are three several Kinds of Mouldings for Picture Frames, or Pannels, with the Method of their Carving. Their Breadth and Projection are divided and figured, so that they must be easy to understand.

Plate LVIII.

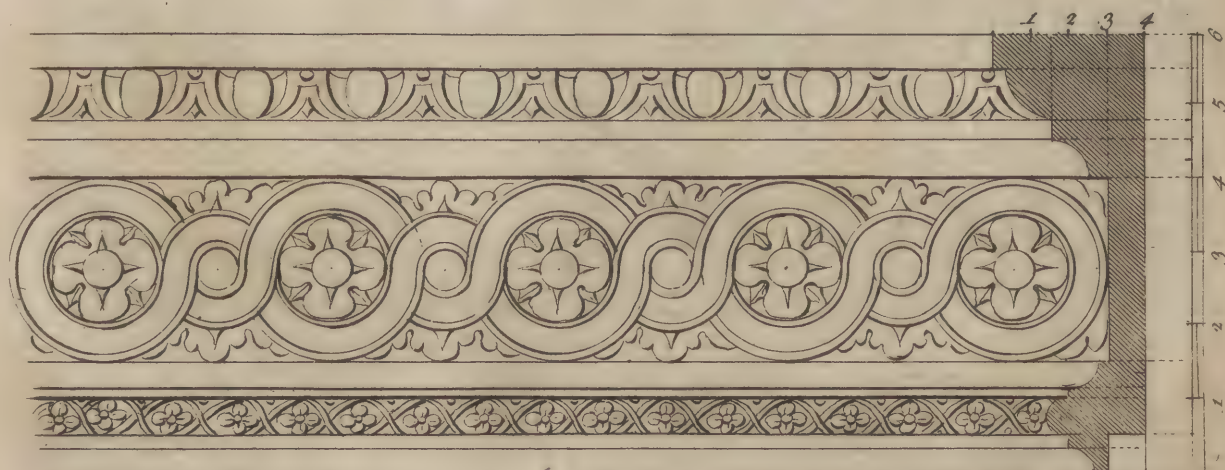
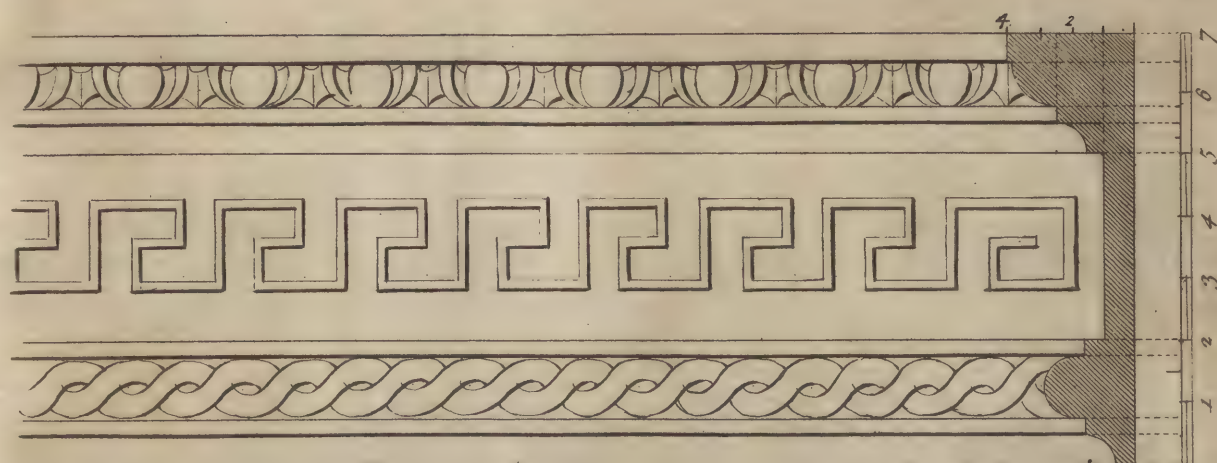
Contains four Kinds of Mouldings, for smaller Pannels, which are to be used between the others for Variety. The Divisions shew the Formation of them, as also you have their Carvings, &c.

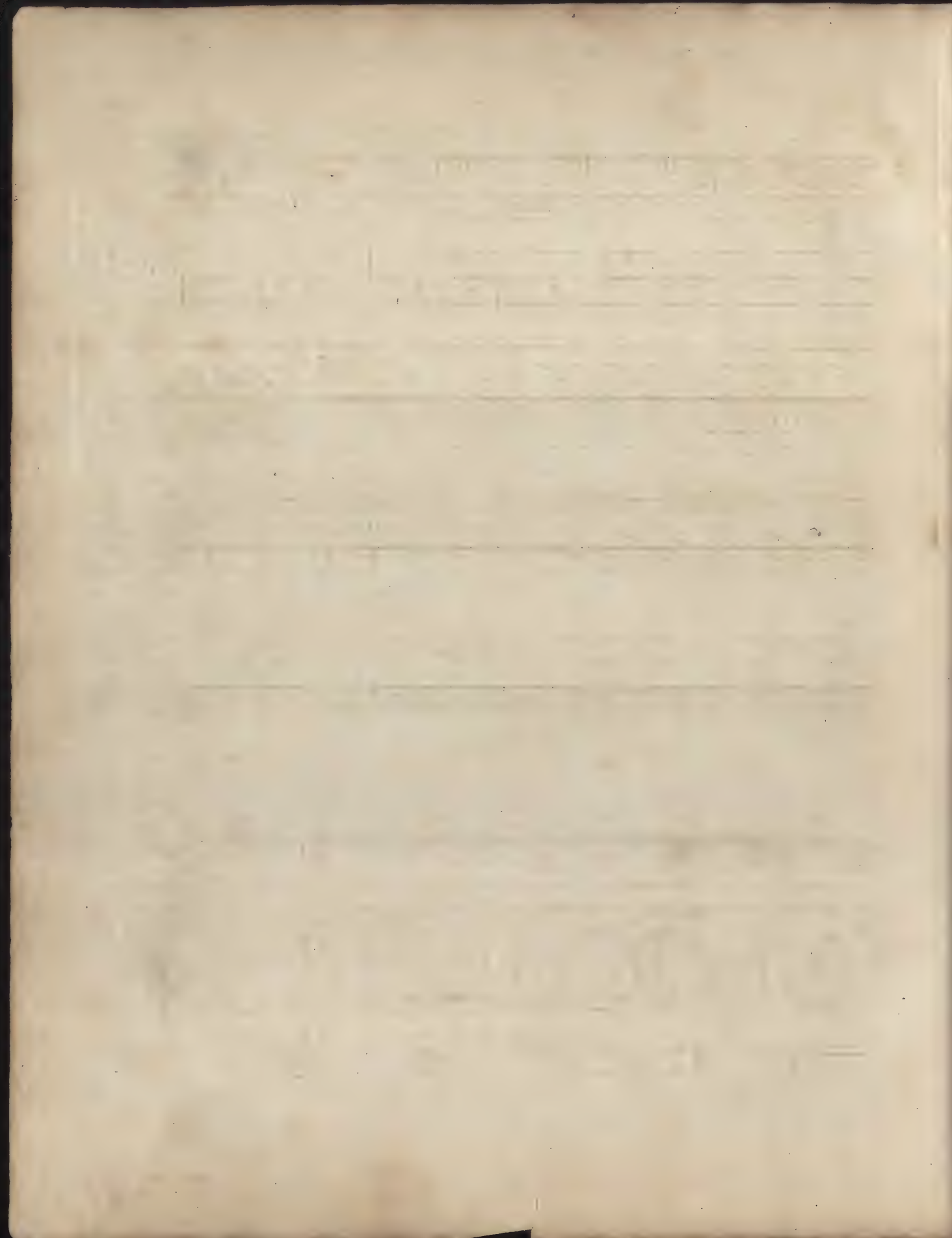


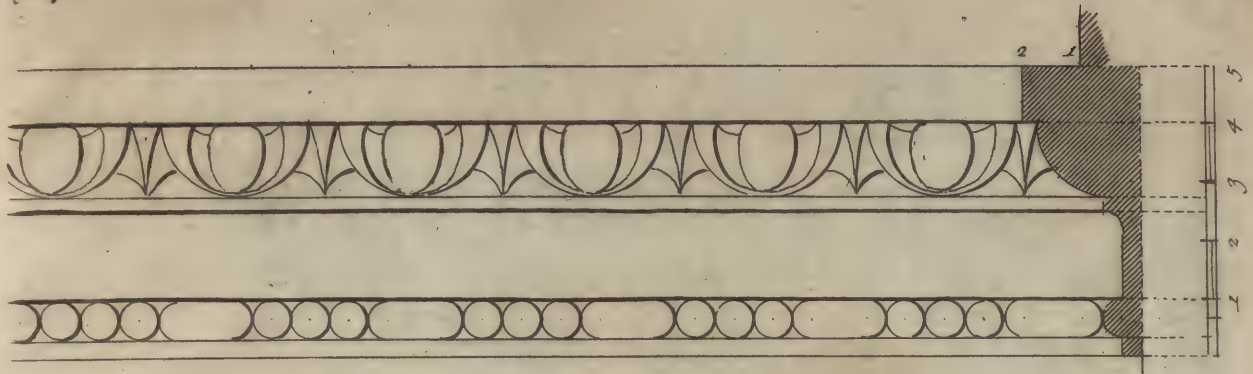
For the Proportions of Rooms, and the Manner of Coving the Cielings. Plate LIX.

THIS Plate contains not only the Plans, but the Sections of Rooms, according to that great Master PALLADIO. The Proportions being as follows (*viz.*) Round, as A; Square, as B; or the Length continued to the Diagonal of the Square, as C; or a Square and one-third, as D; or a Square and a half, as E; or a Square and two-thirds, as F; and lastly, of two Squares, as G.

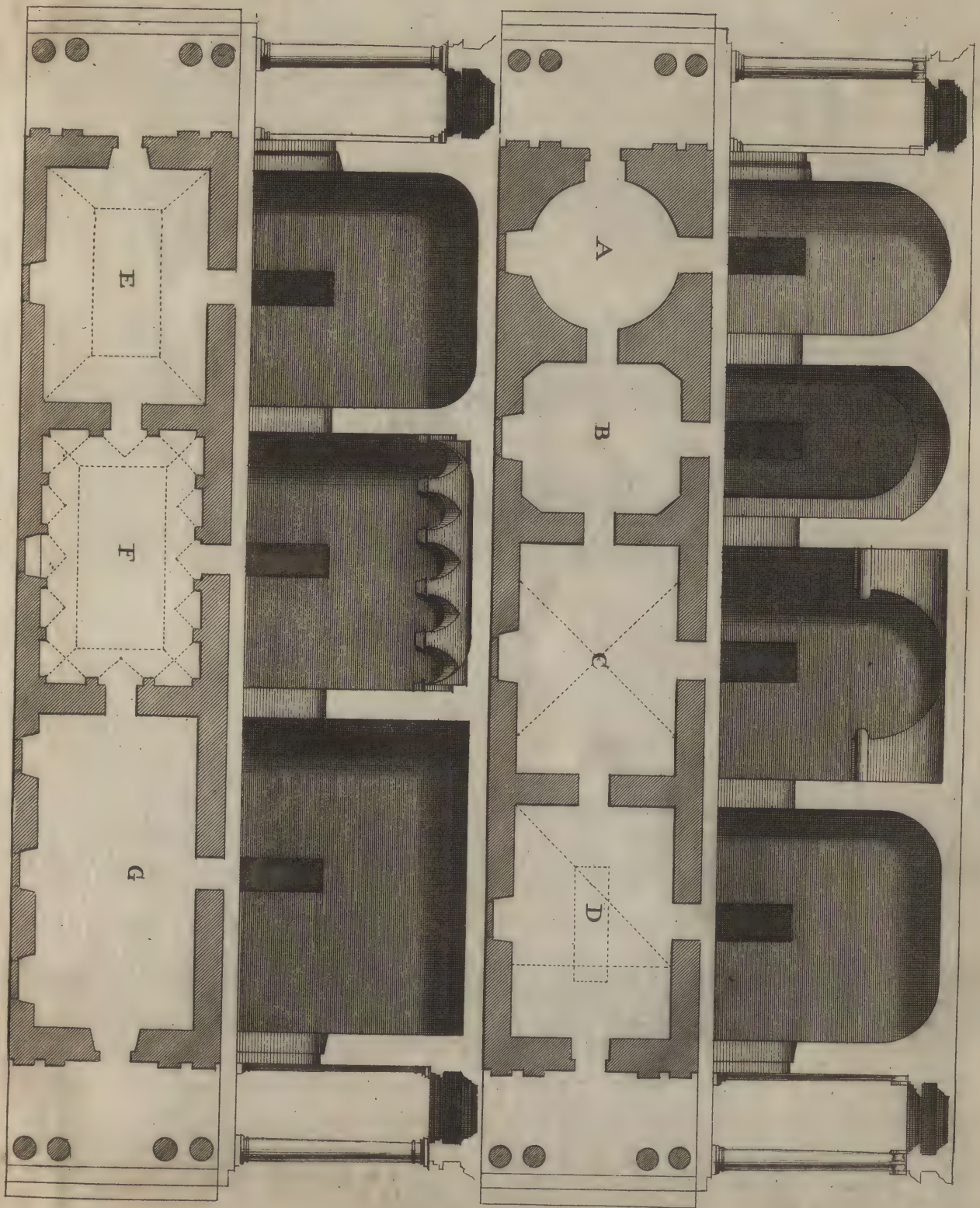
They are made either with an arched or flat Cieling; when the latter is used, the Height from the Floor to the Cieling must be



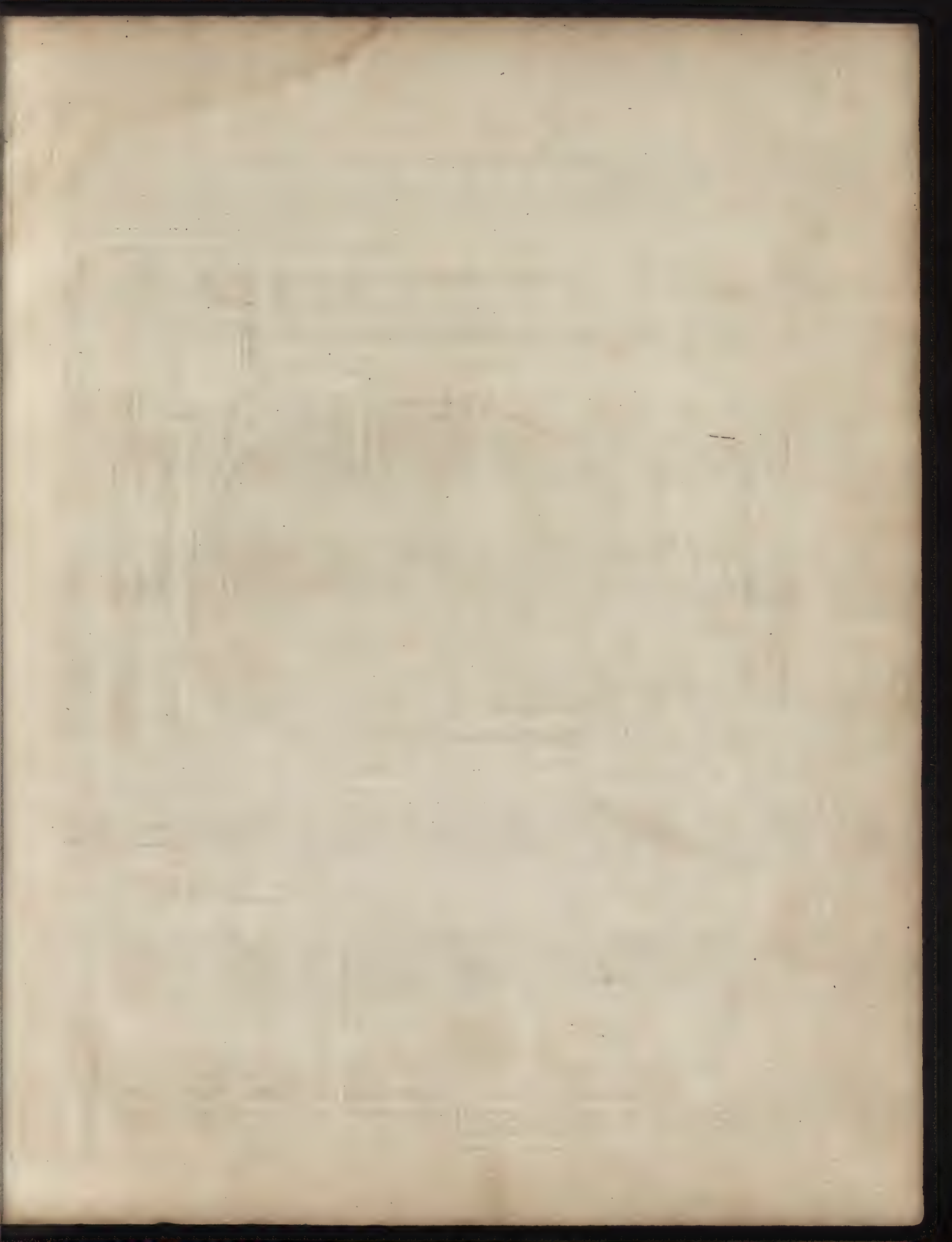


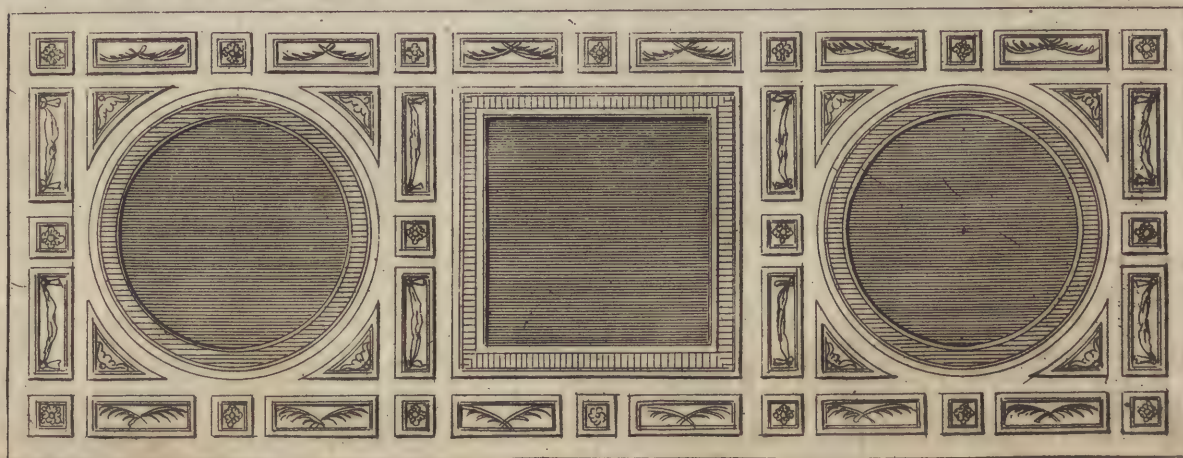




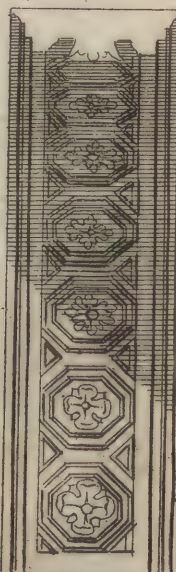
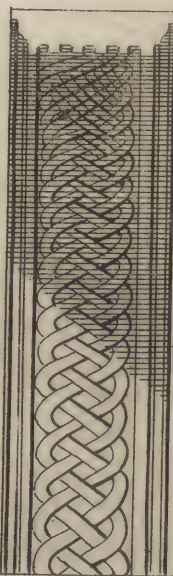
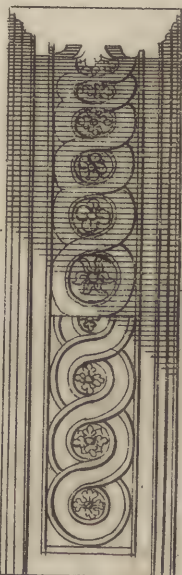
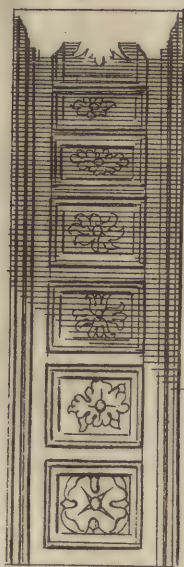












be equal to their Breadth. If on the first or principal Story, the Rooms over them may be one-sixth Part less in Height.

Here are six Sorts of Arches, *viz.* Crossed, Faciated, Flat (being a Segment less than a Semicircle) Circular, Groined, and Shell-like; all which are in Height equal to one-third of the Breadth of the Room; the four first were used by the Ancients, but the two last are of a modern Invention.

Of Cielings, and their proper Ornaments. Plate LX.

This is divided into square Pannels in the Corners, and a large Circle in the Middle, proper for Painting, &c. The Borders, or Margin, are ornamented with Frets and Guilochi's.

Plate LXI.

Are two more Designs for Cielings, the last being proper for a Gallery.

Plate LXII.

Here are different Designs of Compartments for Domes, or Cupolas, and proper Ornaments for the Soffites of Arcades, &c.

For

For the forming of Frets or Guilochi's. Plate LXIII.

These Ornaments, though small, if they are well adjusted, will be very pleasing. You have on this Plate six different Sorts of them; they are frequently used in Picture Frames, Soffites of Arches, and on Architraves, and sometimes on Facia's, and the Plinths of Bases, if the other Members be carved. And whereas it has been hitherto accounted a Difficulty, and by some alledged to be impossible, to *turn* round the *Corner*, or Angle, there being frequently a Flower, or Shell, &c. placed instead of the Fret being continued, here is shewn how they may be done in the most difficult that can be invented.

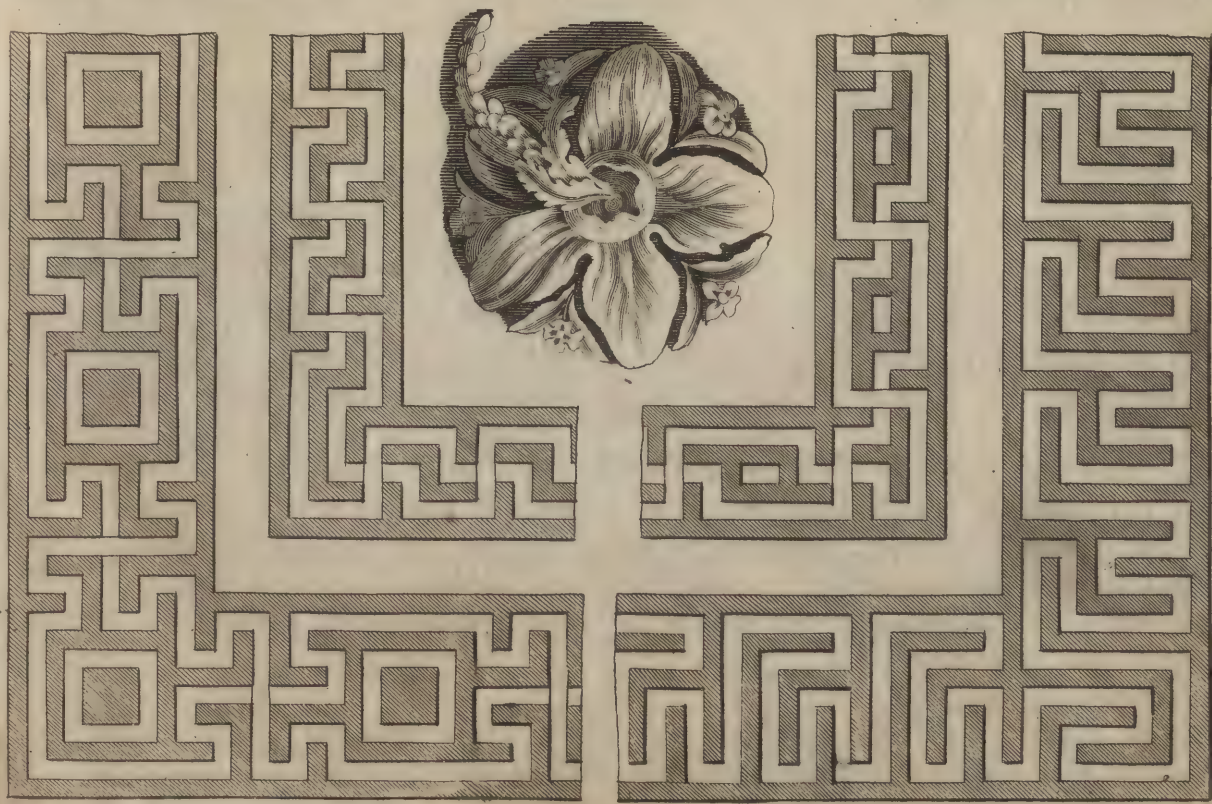
Here are also two large ornamental Flowers.

Plate LXIV.

Contains several more very different from the beforegoing, and the Method for continuing them round the Corners is also shewn; so that it is hoped nothing of this Kind is wanting further.

Plate LXV.

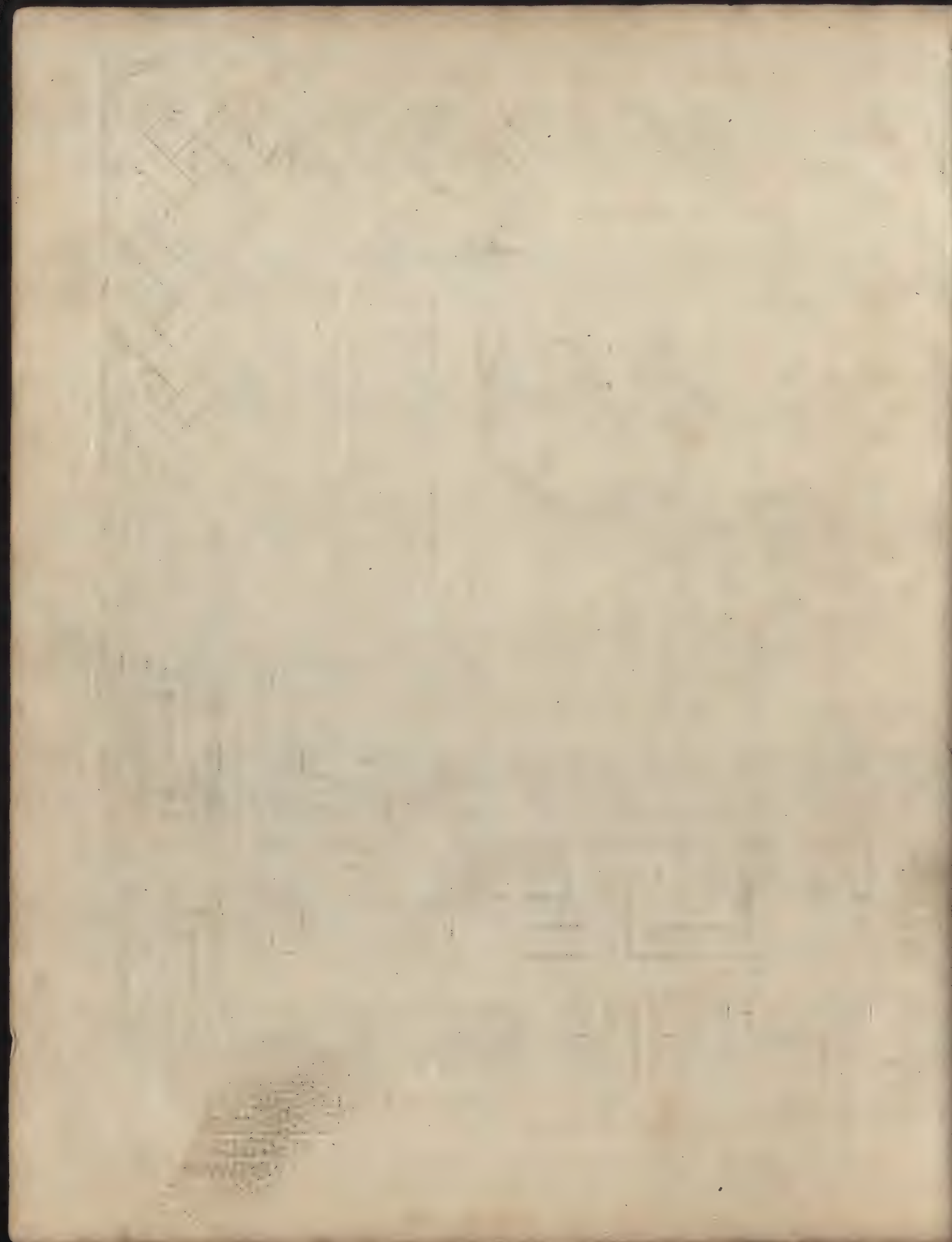
Are three different Designs for Obelisks. There is no certain Rule for them delivered by the Ancients, for those at *Rome* all vary. In these three their Height are in different Proportions (*viz.*) six, seven, and eight times the Bigness at the Bottom; the first appears rather too low, and the last too high, therefore it were adviseable to use the Middle one as a Medium,

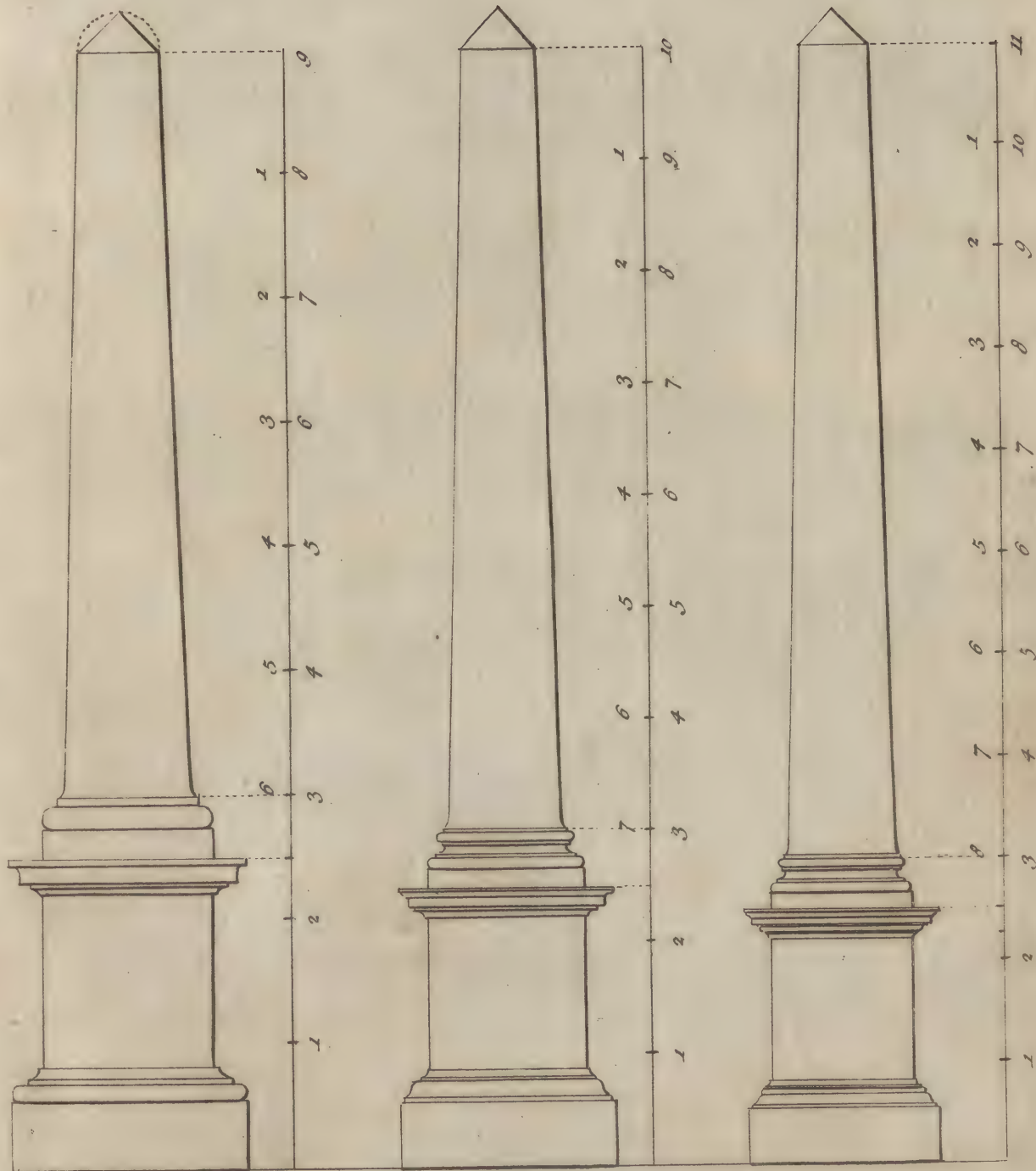


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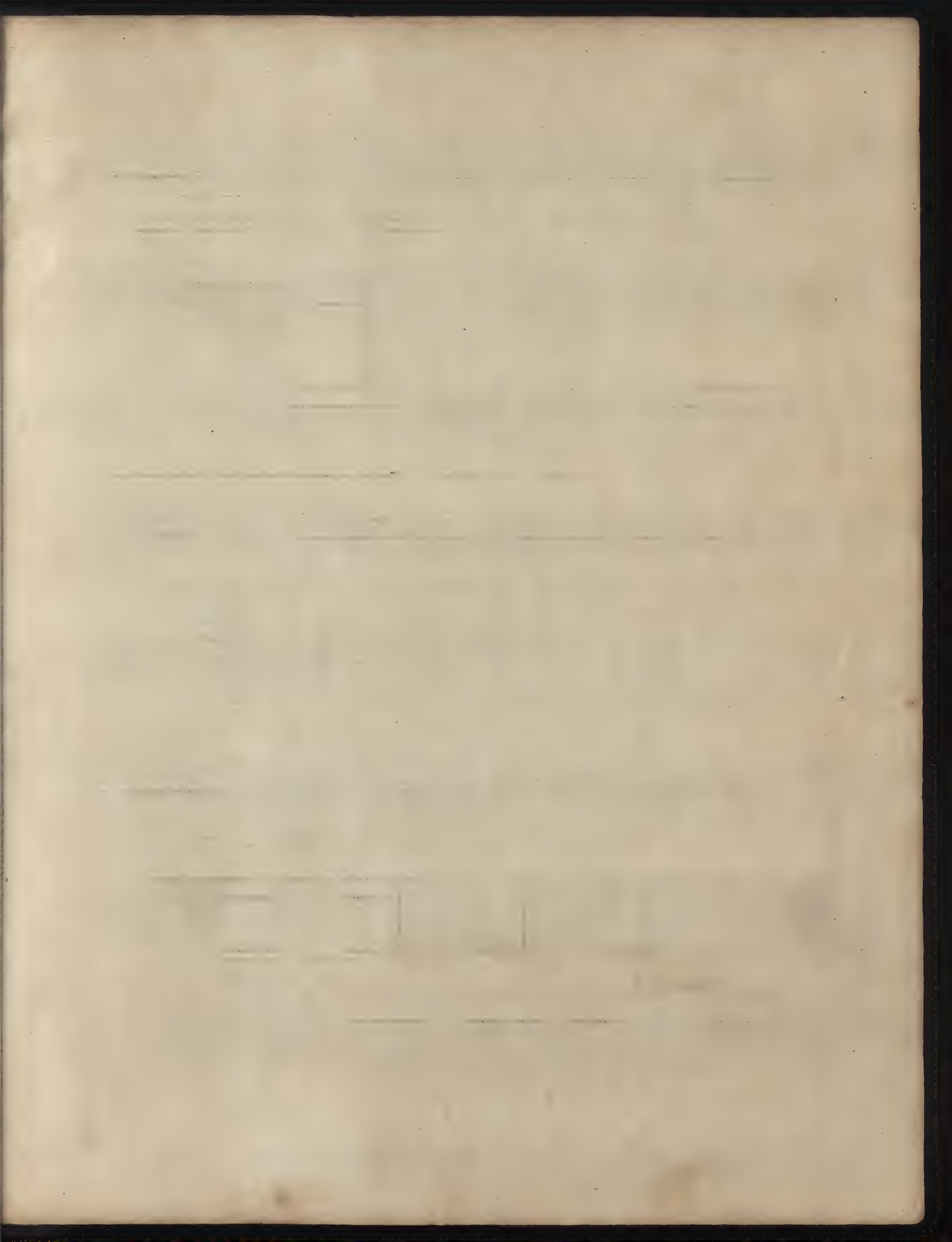
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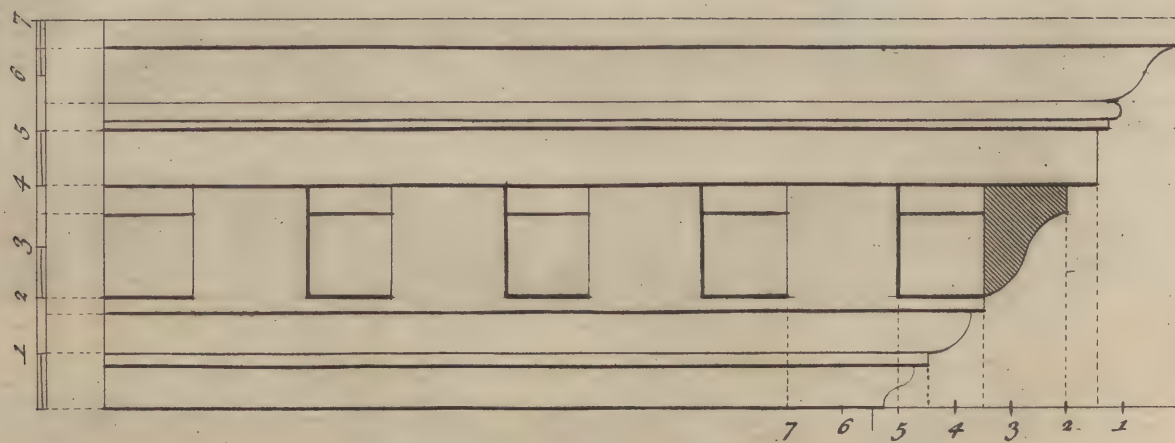
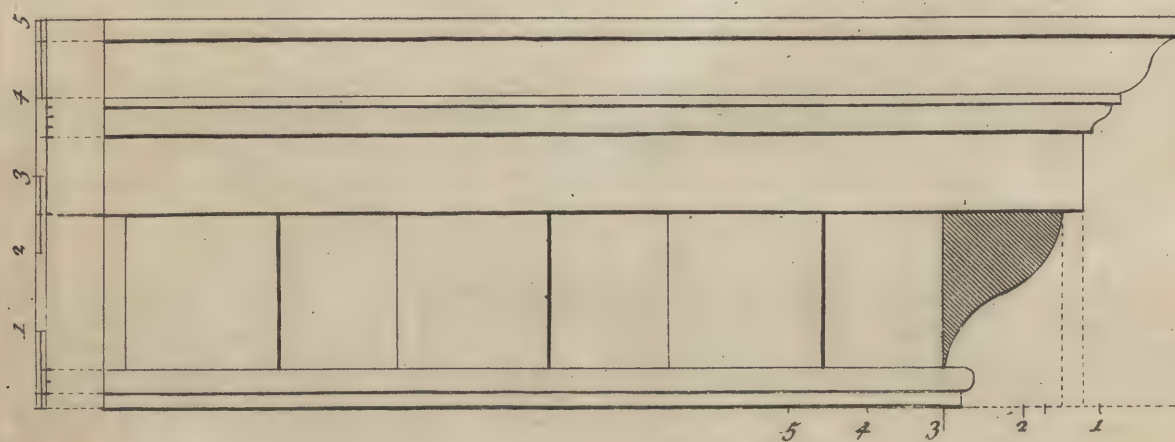
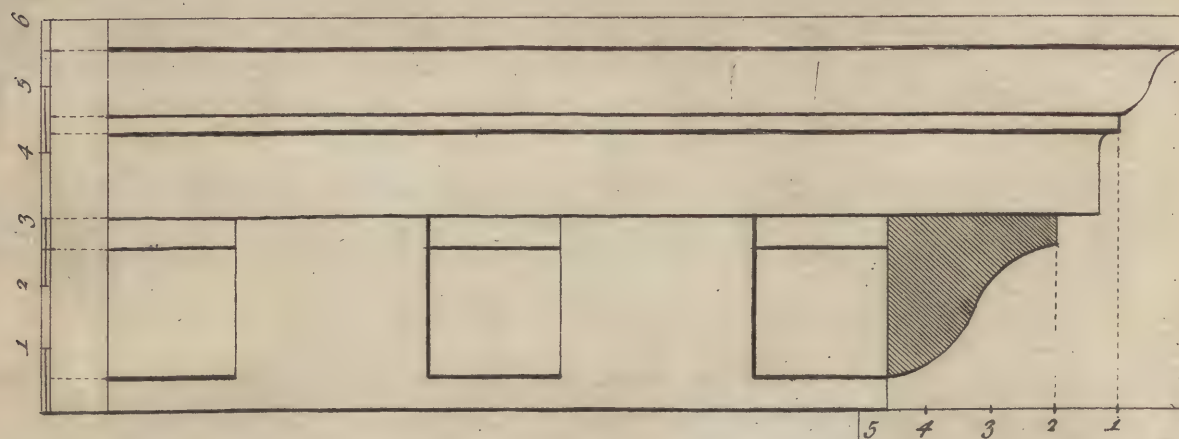


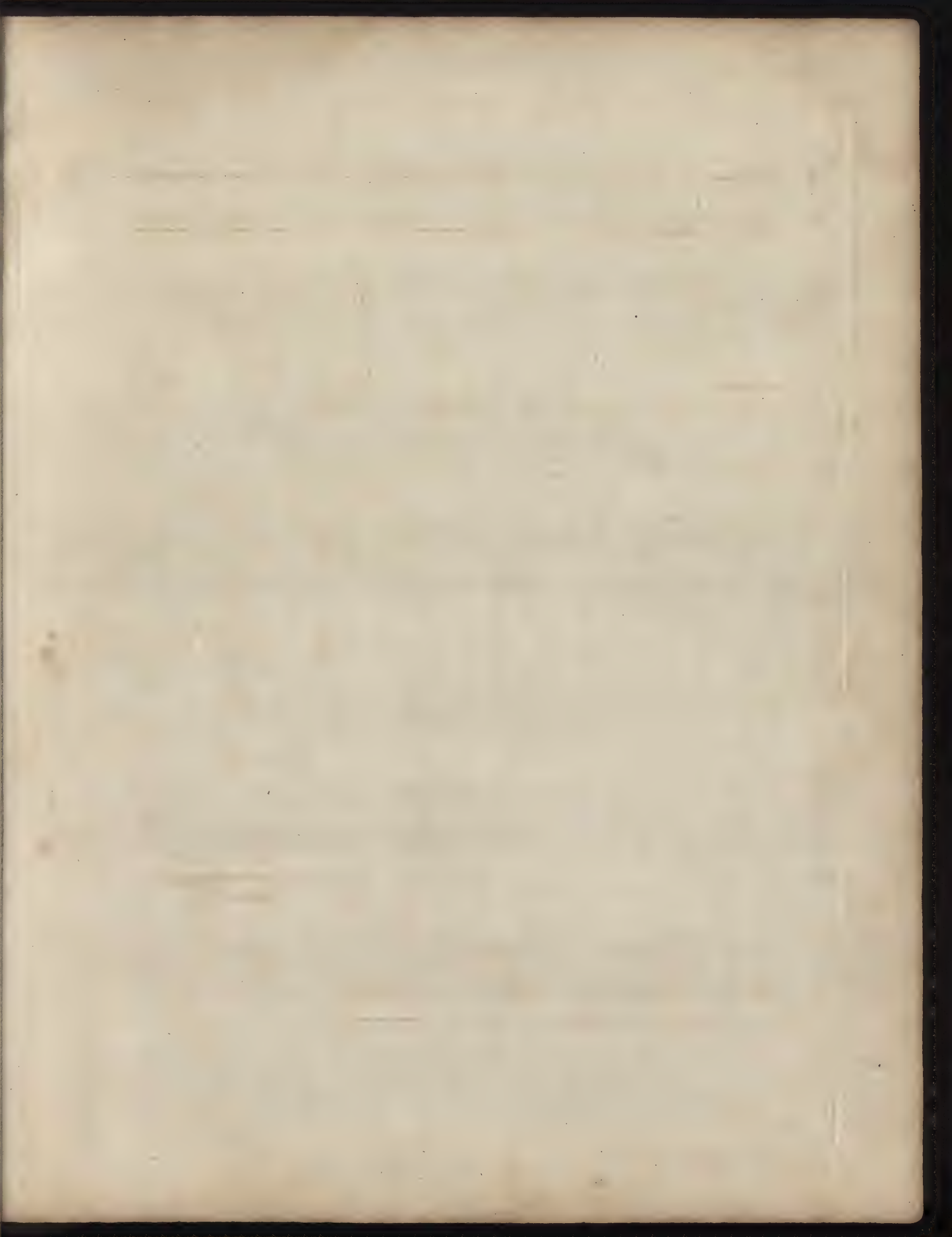




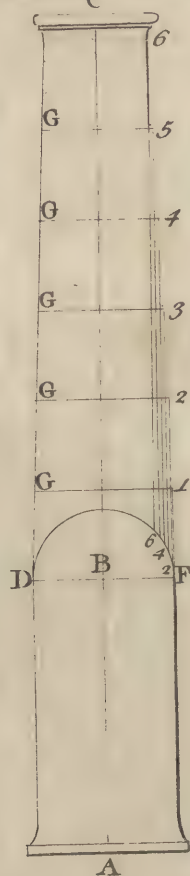




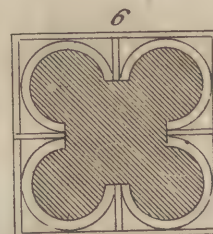
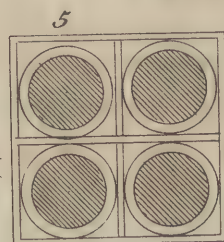
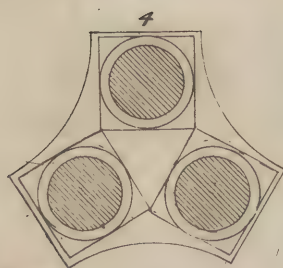
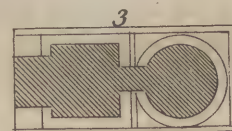
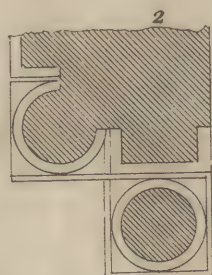
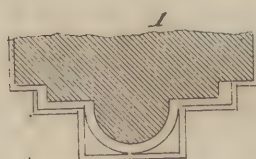




Dimenition of Columns



Balusters Extraordinary



Medium between the two Extrems, as also to observe the following Rules; Let them all diminish one-third of the Diameter, and the Point, or finishing at Top, to form a Square.

The Base of them all hath half the Diameter, and the Pedestals hath two Diameters and an half, whose Plinth and Base is one-third of the whole Height; and one-third of the said Plinth and Base being given to the Base, and the same Height to the Cap of the Pedestal, will make the Dado of the Pedestal a perfect Square; all the rest must be easy.

Plate LXVI.

Here are three different Methods of forming Block Cornices; the Divisions are all figured, so that they are easily understood; and observe that the Projections are set off by the same Parts as the Heights, tho' these Kind of Cornices do not (like others) project equal to their Height.

Plate LXVII.

On the Left Hand of this Plate is the Method to diminish all the foregoing Columns. Suppose A B C to be the central Line, and observe that they all diminish from one-third of the Length between Base and Capital; therefore on B, with the Radius of B F, or B D, make the Semicircle D E F; and from the Extream diminishing under the Astragal, as before taught, let fall a Perpendicular on the said Semicircle, as at 6; divide the Part 6 F into any Number of equal Parts, as suppose into six; divide also the upper two-thirds of the Column into the same Number, and through the Divisions on the central Line

M

draw

draw level Lines, and from the Part of the Semicircle 6 F, raise Perpendiculars corresponding with them, and where they intersect will be the Points through which the diminishing, or swelling Line must pass, as G, G, G, G.

Also on this Plate are Designs of Balusters adapted to the *Five Orders*, as also Balusters extraordinary.

At the Bottom are the different Manners of disposing of Columns and Pilasters.

Fig. 1. Is a half Column flanked, with two Pilasters wing-ways.

Fig. 2. A Pilaster with a detached Column, and a Column on the Angle.

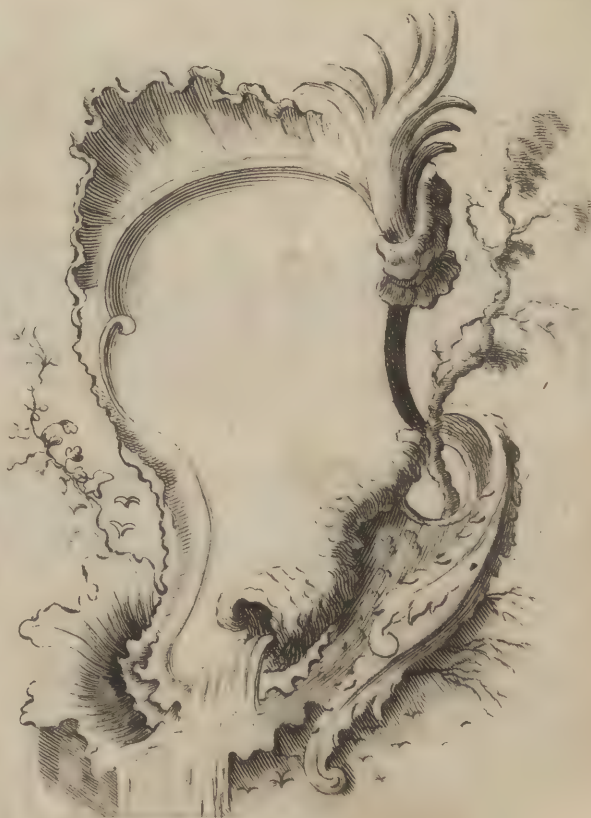
Fig. 3. A Pilaster and Column tied or joined together, as may be seen in the Portico of St. George's Hanover-Square. And,

Fig. 4, 5, 6. Are Groups of Columns.

Plates LXVIII, LXIX, LXX, LXXI, LXXII, LXXIII.

On these are twenty-four Shields, or Compartments, of a new Invention, very proper for Carvers, Painters, Sculptors, &c.

Having now shewn all that is necessary in the right Construction and Understanding of the Rules of Architecture, we next proceed to shew the different Manners of all Kinds of Roofs, Square or Bevel, with their Trusses, &c.







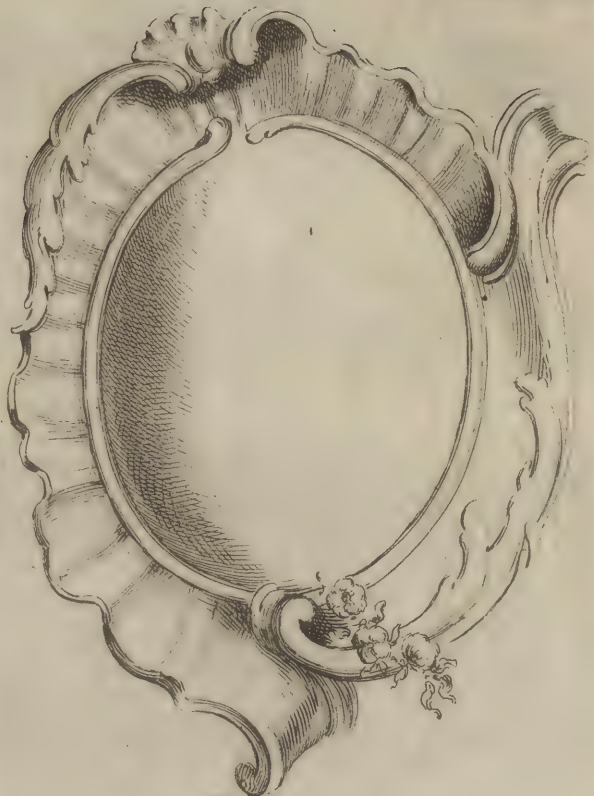


















Fig. 1

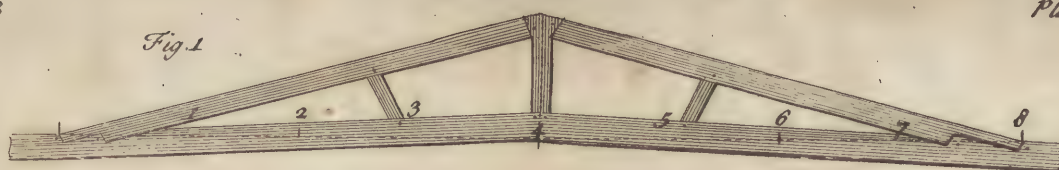


Fig. 2

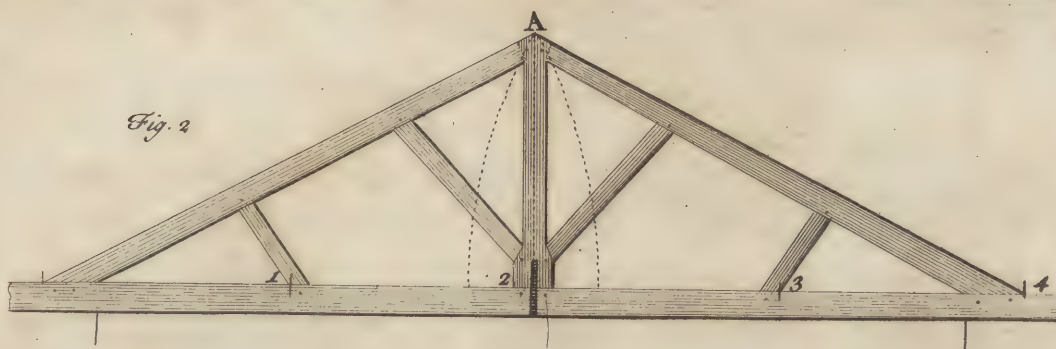


Fig. 3

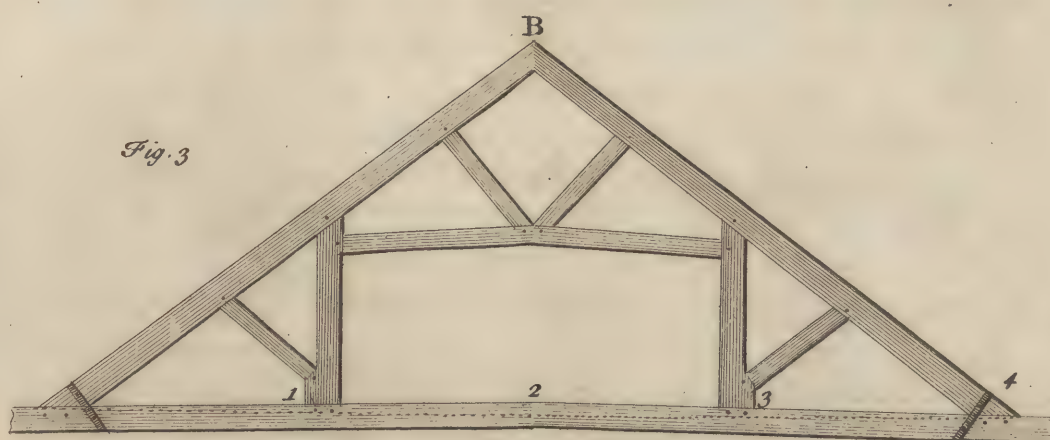
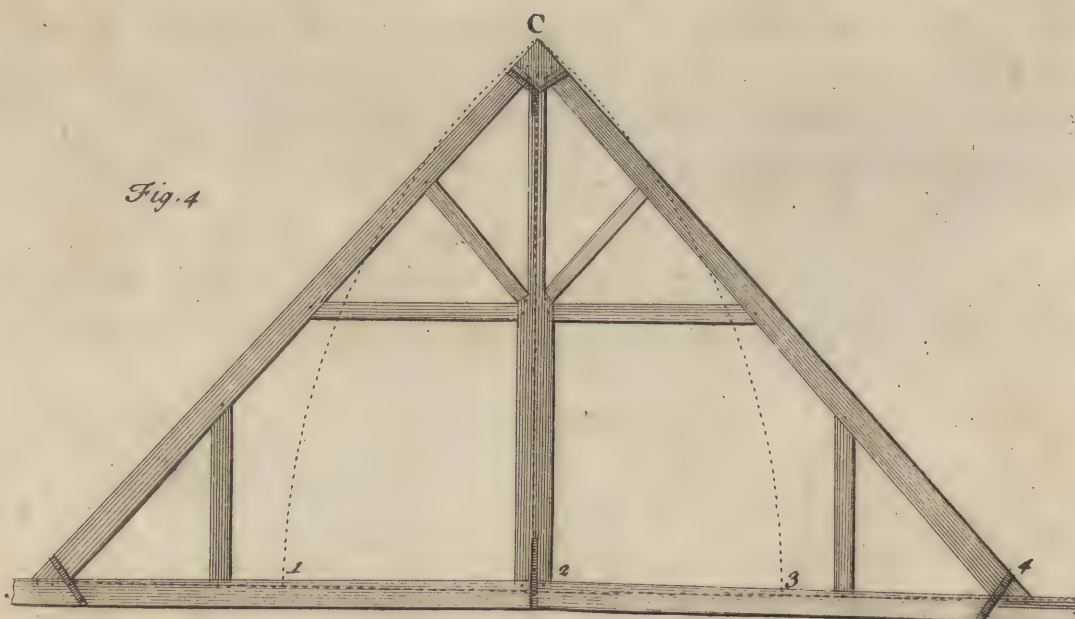
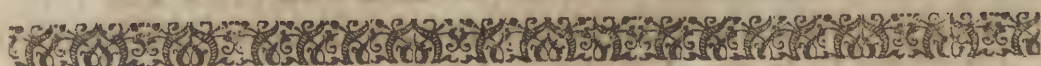


Fig. 4





Of Roofs. Plate LXXIV.

WHAT is first to be considered in Roofs, is the Materials wherewith the Building is to be covered, as Lead, Pantiles, Slates, or plain Tiles, each of them requiring a various Pitch or Slope, for which the following Rules are to be observed.

Fig. 1. Is a flat Roof, having only one-eighth of the *Span*, or Breadth of the Building, for its perpendicular Height, and must be covered with Lead, and the Rafters being joggled into the Beams (which are made Camber) will be very substantial.

Fig. 2. Is also a proper Pitch for Lead Covering; its perpendicular Height is found by dividing the Span, or Breadth of the Building into four equal Parts, and subdividing the Part between 1 and 2, or 2 and 3, also into four equal Parts, take half the Building and one of these Parts for the Length of the Rafter, which Length being used as a Radius on the Extremities, describe the Arches intersecting in A, will give the perpendicular Height.

Fig. 3. Is a proper Pitch for covering with Pantiles or Slates.

The perpendicular Height is found by dividing the Span also into four Parts; then divide one of the middle Parts into two, and take half the Building, and one of those Parts, for the Length of the Rafter, which will intersect in B, the perpendicular Height required.

Fig. 4. Is a Pitch proper to be covered with plain Tiles.

The perpendicular Height is found by dividing the Span (as before) into four equal Parts, and taking three such Parts for the Length of the Rafter, it will intersect in C, the perpendicular Height. And *Note*, This Proportion is called True (or Common) Pitch, it being most in Use.

Plate LXXV.

That Examples may not be wanting to make this Work compleat, here follows a Variety of Truss Roofs of the newest Invention, both for Strength and Beauty.

On this Plate is shewn four different Roofs. Fig. 1. Is a flat Roof, having one-sixth of the Span for the perpendicular Height, and is to be covered with Lead, and, with the Trusses here shewn, will be exceeding strong.

Here is also shewn the Manner of making Drips to walk on, as A.

Fig. 2. Is a Roof so contrived, that if the before-going Pitch for plain Tiles should be thought too high, its Height may be reduced by this Method; To have a Gutter in the Middle, and these are called M Roofs, and are commonly used; whereby one-third of the Height will be taken off, as the Figures shew by Inspection.

Fig. 3. Is a Roof cut off but a fourth Part of its Height, as appears by the Figures, and is sufficiently strong (by having the counter Rafters under the Principal) without the Braces represented by the pricked Lines.

Fig. 4.

Fig. 1

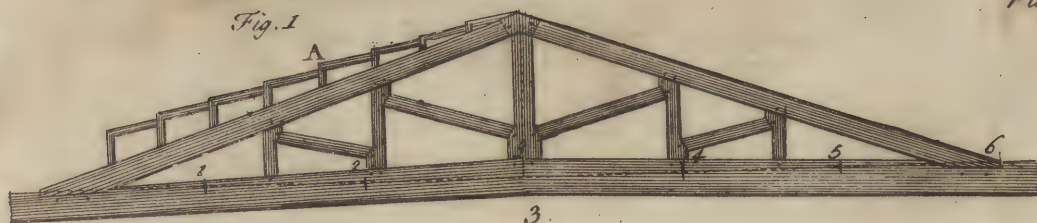


Fig. 2

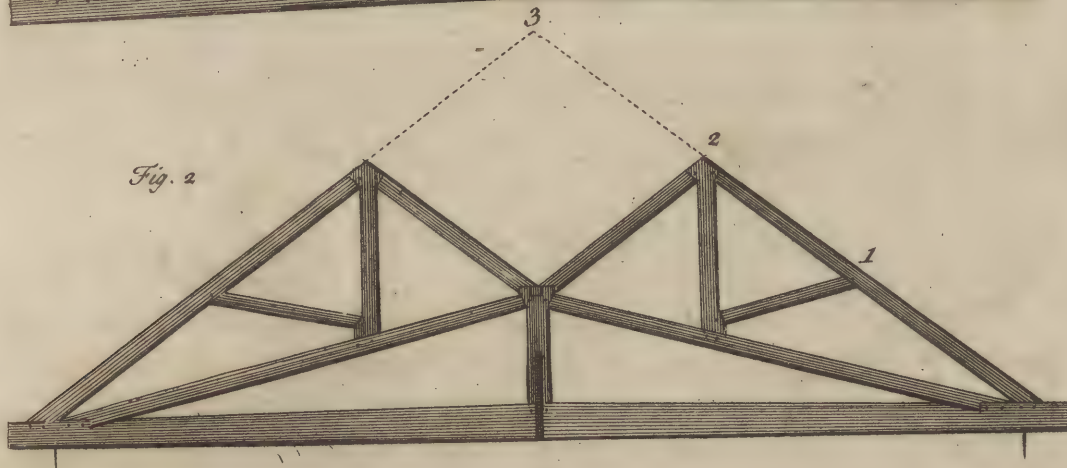


Fig. 3

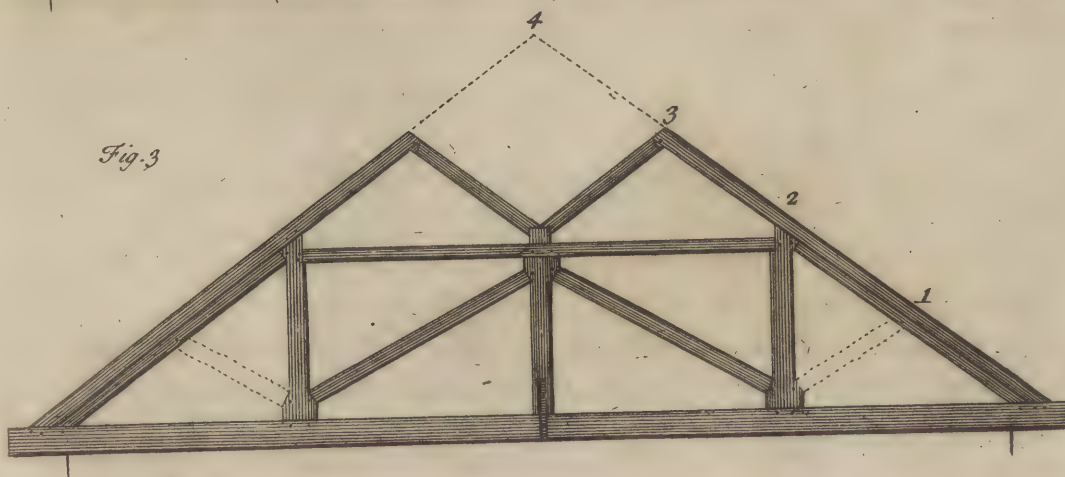


Fig. 4

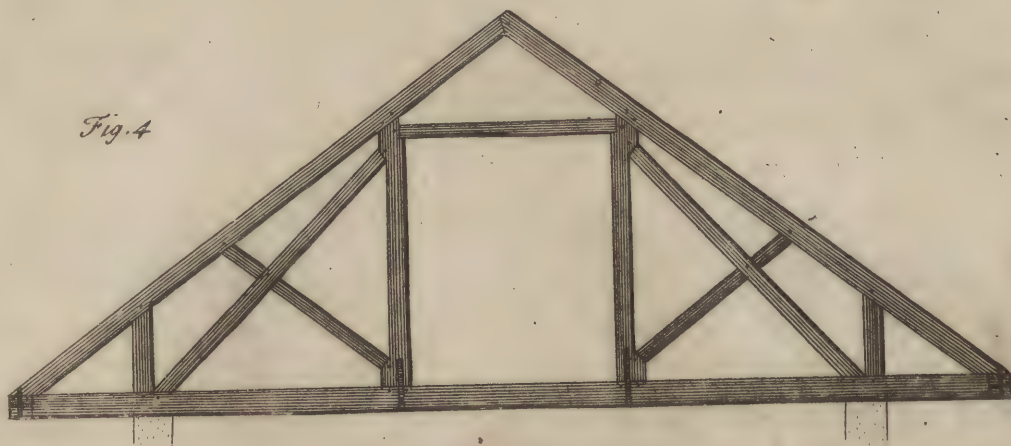




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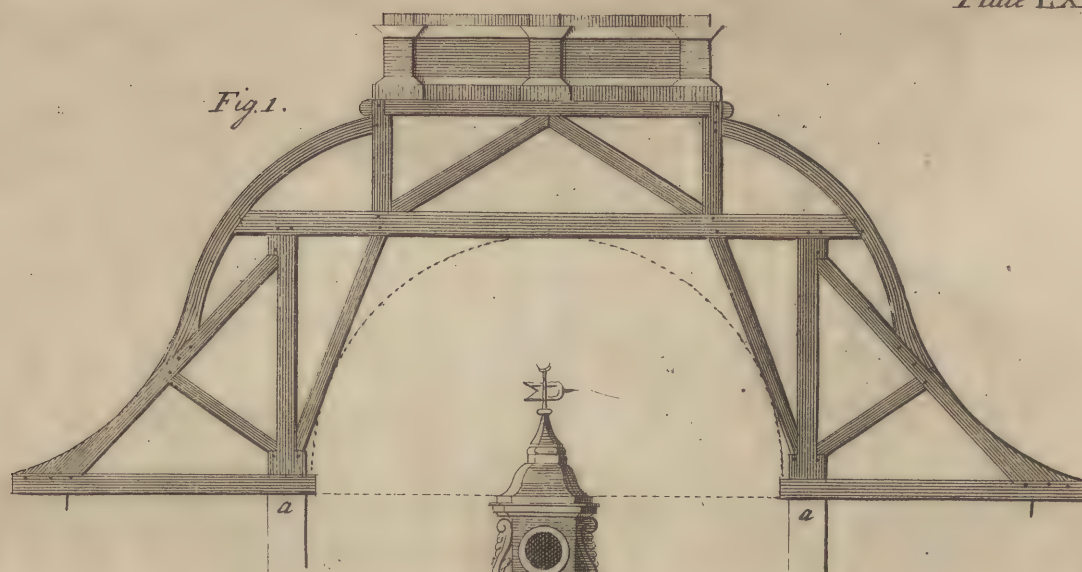


Fig. 2.

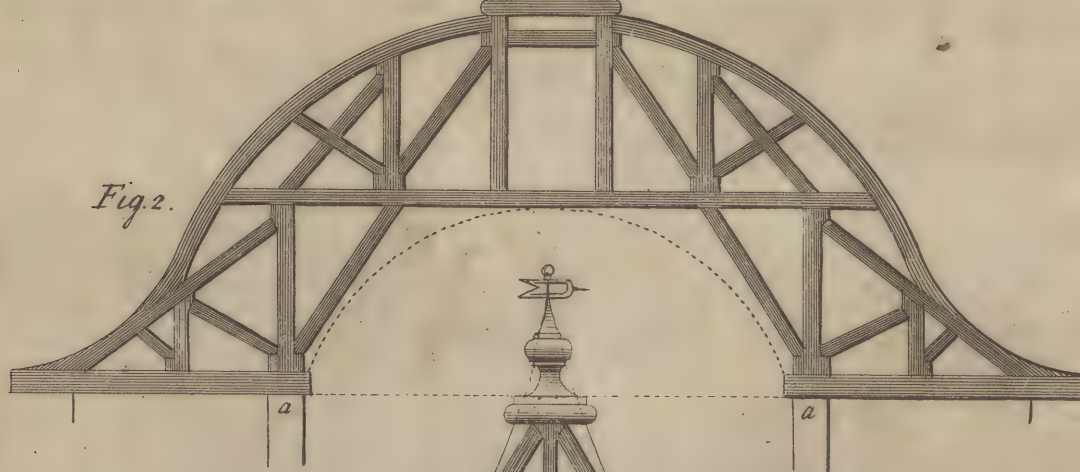
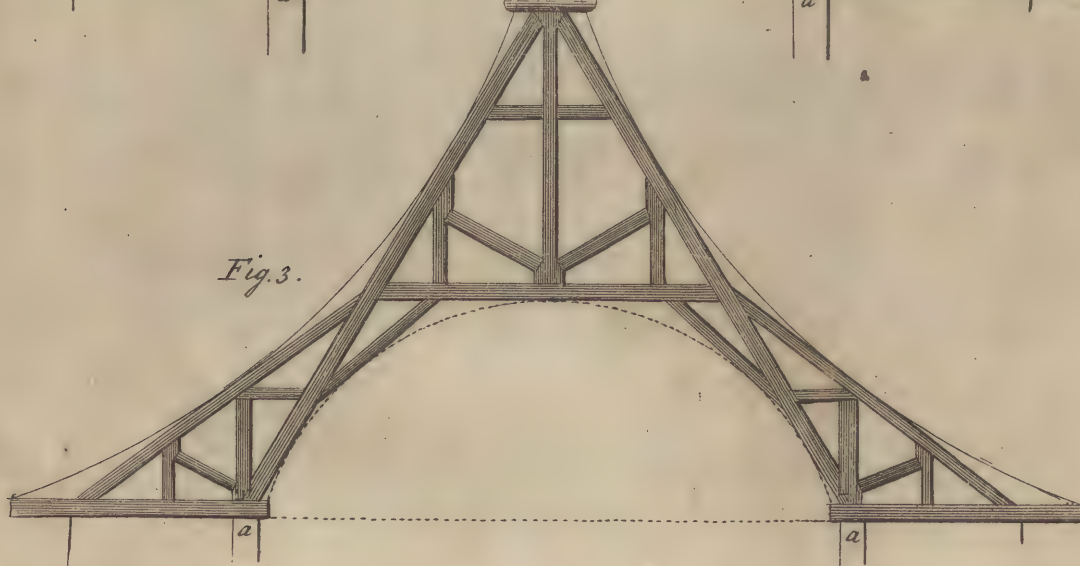


Fig. 3.



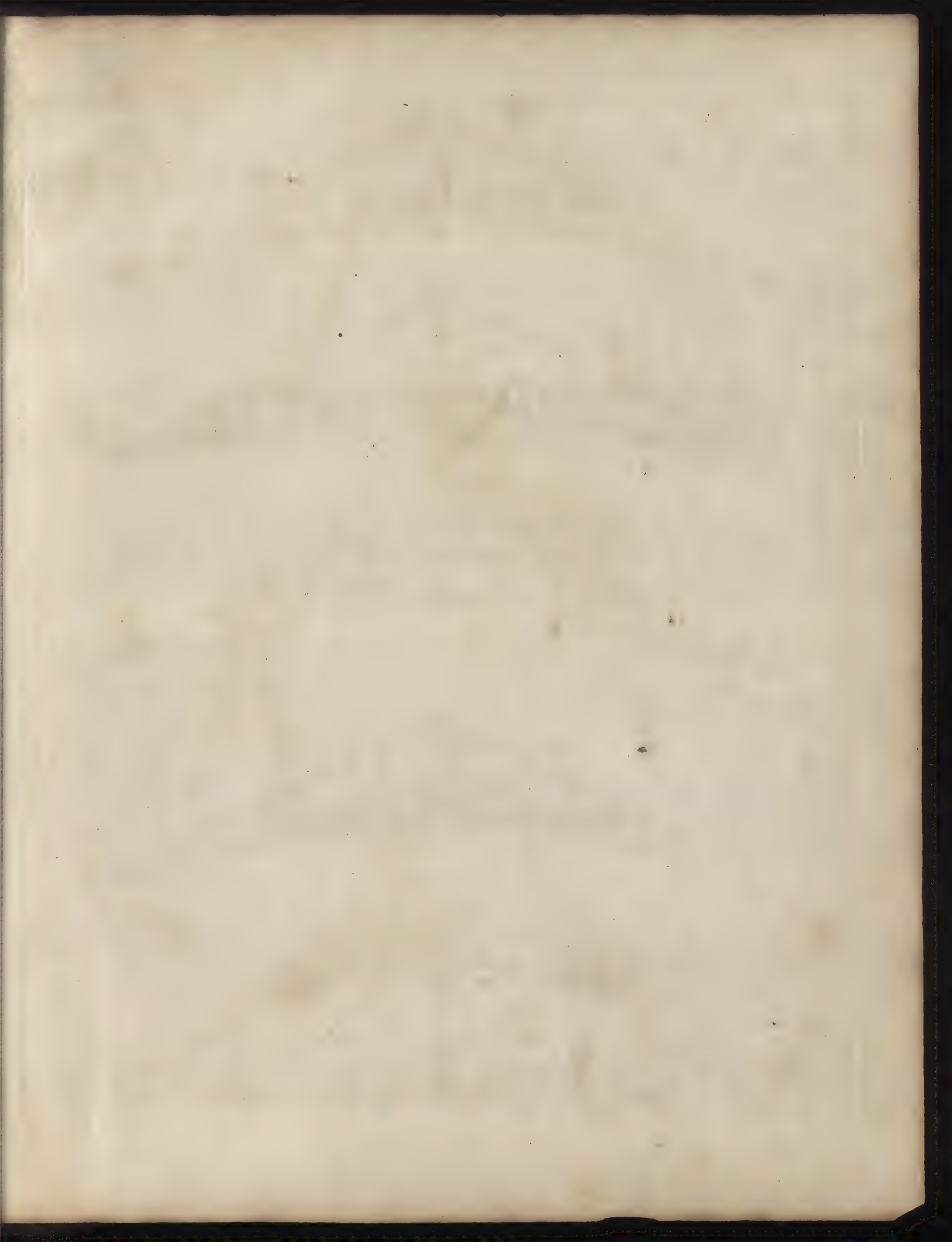


Fig. 1.

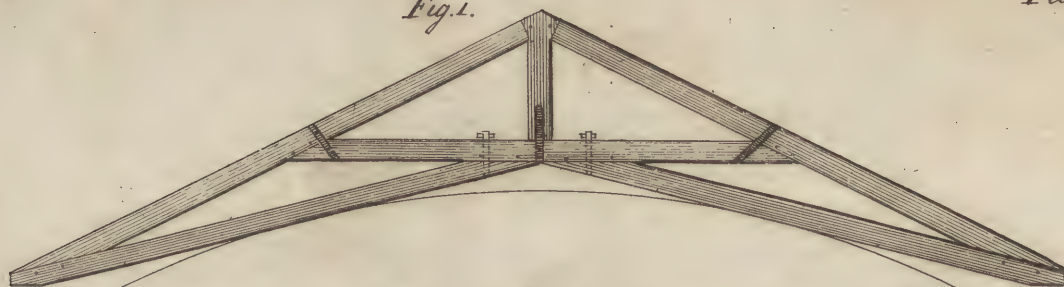


Fig. 2.

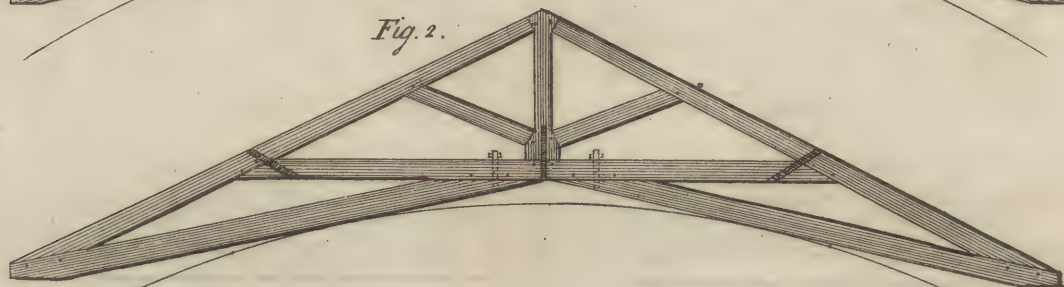


Fig. 3.

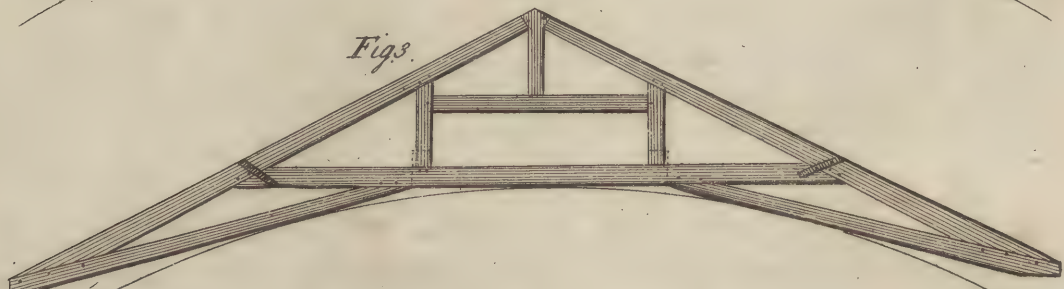


Fig. 4.

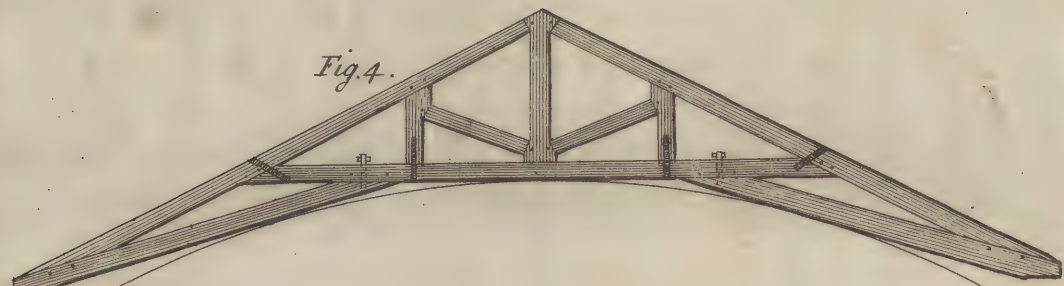


Fig. 5.

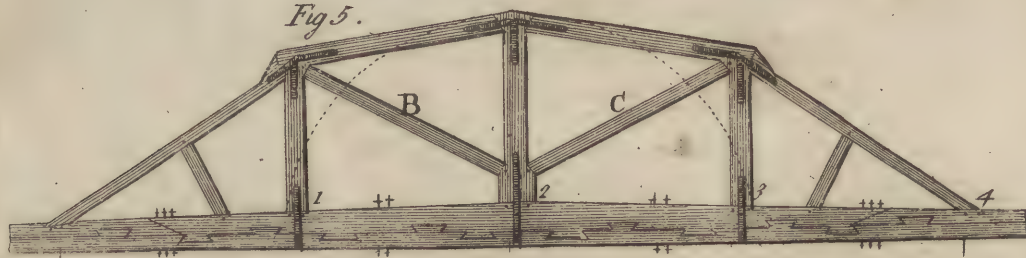


Fig. 4. Is a Truss Roof where the Span exceeds the Breadth of the Building, and gives a Covering, or Shelter, not only to the Building, but to those under the Eaves, as *Covent-Garden Church, &c.*

Plate LXXVI.

For the abovesaid Reason, that I may not be deficient in pleasing each ones Taste, here, on this Plate, you have four different Manners of trussing flat Roofs.

Plate LXXVII.

On this Plate, Fig. 1, 2, 3, and 4, are four different Methods of framing flat Roofs, so that the Cielings may be curved (or circular) and the main Beam, or Tye, interrupted.

Fig. 5. Is a Roof partly flat, and differing from all the former ; it rises one-fourth of the Span, and by scarfing or piecing the Beams together in this Manner, will be capable of extending to any Breadth whatsoever : And if Room is required in the Middle of the Roof, the Braces marked B and C may be left out.

Plate LXXVIII.

As Curvilinear Roofs are sometimes used, I would not be wanting in exhibiting the Manner of them ; on this Plate you have three different Sorts, by which others may be formed.

Fig.

Fig. 1. Is so ordered to have a Balustrade, and a Flat, in the Middle of the Building thereby commanding a Prospect, &c.

Fig. 2. Is proper for a round Temple, or large Summer-House, which at a Distance will appear like a Dome; the hollow Part being but small, will be lost to the Eye below; if hereon you add a Cupola, or Turret, it will either serve to illuminate the Inside, or to place a Clock in, &c.

Fig. 3. Is a Hollow Roof, which may with great Propriety be used either for a square, circular, or octangular Plan; nay, any regular Polygon whatever.

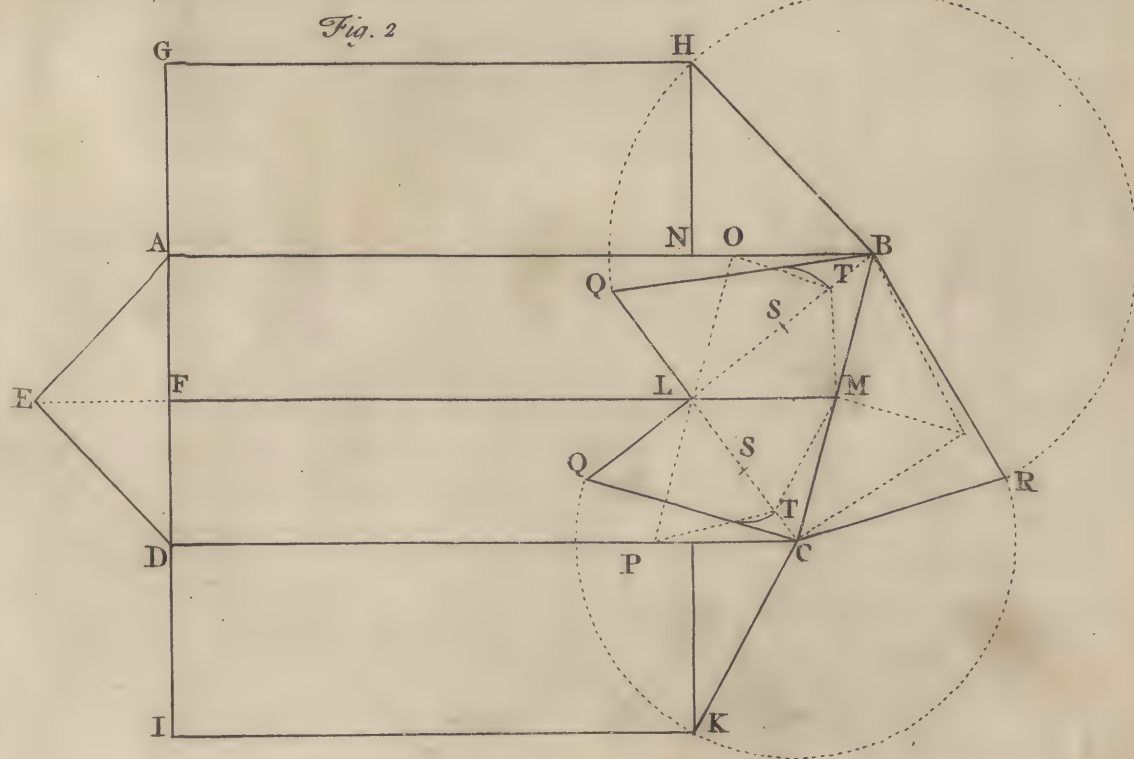
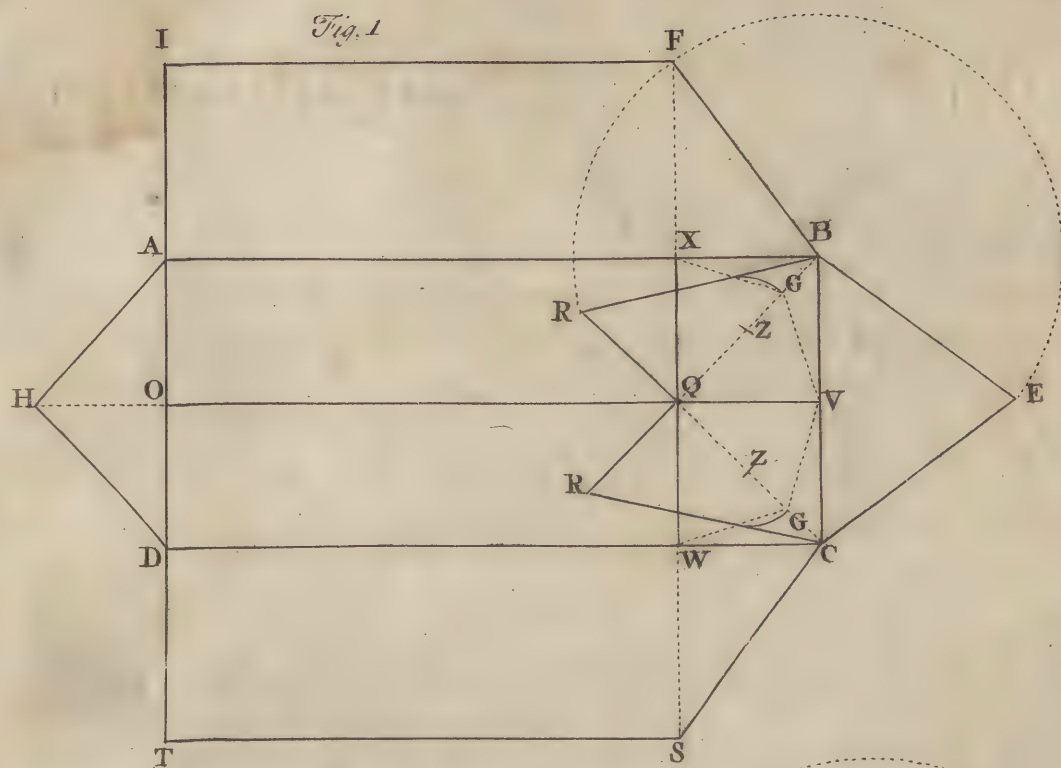
It is to be observed, that in these Kinds of Roofs, the main Beam, or Tye, is likewise cut off (as in the last) and hath thereby a concave Cieling in each, being supported by Columns as at a, a, a.

Of HIP ROOFS. Plate LXXIX.

On this Plate you have Instruction to find the Length and Backing of the Hip-Rafter, in such a Manner as to answer the Side and End of the perpendicular Line of the Gable-end, the two Skirts, the Side of the Roof, whether it be in Llano, or lying in Ledgment, with the Hip and Gable-end. The Diagonal and perpendicular Lines being laid down proportionable to any Breadth or Length.

Example. Fig. 1.

Let ABCD be the Sides and Ends of the said Roof, one End to be hipped, the other a Gable-end. Draw the Lines ABCD, which





which is the Plan of the Roof; then draw the Gable-end AHD, whose Sides AH, and DH, are each equal in Length to three-fourths of the Span, or true Pitch, as before mentioned. Next draw the perpendicular Line OH, which is the Height of the Gable-end, and this Line is of general Use to level the Ridge of all Roofs; and when the other End is hip-ped, as in CBE, then its Use is to find the Length and Back of the Hip, so that it shall answer both Sides and Ends of the Roof; observing that the Middle of the Span is as OV. Then draw the Lines SWHF through the Center Q, which will be as Right-Angles to the Line OV, in Square as well as Bevel Houses; and the Distance WS and HF, are each equal to the Length of the Rafters AH, or DH; then extend the Line AD, on both Sides, to T and I, and to the same Length also, so will IF, and ST, make the Length of the Ridge QO, and SC and BF, the two Skirts. Then,

To find the Length of the Hip.

Draw the diagonal Lines CQ and QB, over which the Hip will hang when it is in its due Place; then taking the Perpendicular OH, placed from the Point Q, to the Points RR, the one being perpendicular to the Diagonal or Base Line CQ, and the other QB, so is QR and QR, the Pitch of the Hip, equal to the Gable-end OH, and, when raised up, will be perpendicular to the Point Q; then taking the Lines CR and RB, and placing them from C to E, and from B to E, will give the Skirt of the Hip CEB; which, when put in its proper Position, the Point E will hang over the Point Q, and join with the Points F and S.

To

To find the Back of the Hip, so as to answer to the Sides and Ends of the Roof, whether Square, or Bevel.

Lay a Ruler from the Point W to the Point V, and from the Point V to X ; and mark where it cuts the diagonal Line C Q and Q B, as at Z Z ; and setting one Foot of the Compasses in the said Point Z, extend the other Foot to the nearest Distance on the Hip Lines C R, and B R, and with that Distance make the Points G G, on the Diagonals, and drawing the pricked Lines W G V, and V G X, will form the Back of the Hip for the two Corners of that Roof.

Fig. 2. Here you have a Roof bevel at one End, and square at the other ; the Gable-end is square, but the Bevel-end to be hipped.

First lay down the Plan of the Building, as A B C D, one Side, being longer than the other, which occasions the Bevel ; next draw the Gable-end A D E, whose Sides, from D to E, and from A to E, is three-fourths of the Span as before ; then drawing E L, the perpendicular Height, which must determine the rest, as before taught.

Next, the Sides must be skirted out, as G H, I K ; then dividing the Span into two equal Parts, and drawing the Line F L M, take the Distance L N, which is the Half of the Span, and make it parallel to C M B, as P L O, and L will be the Point, whose Perpendiculars Q L, will meet the common Rafter and Hips.

Fig. 1

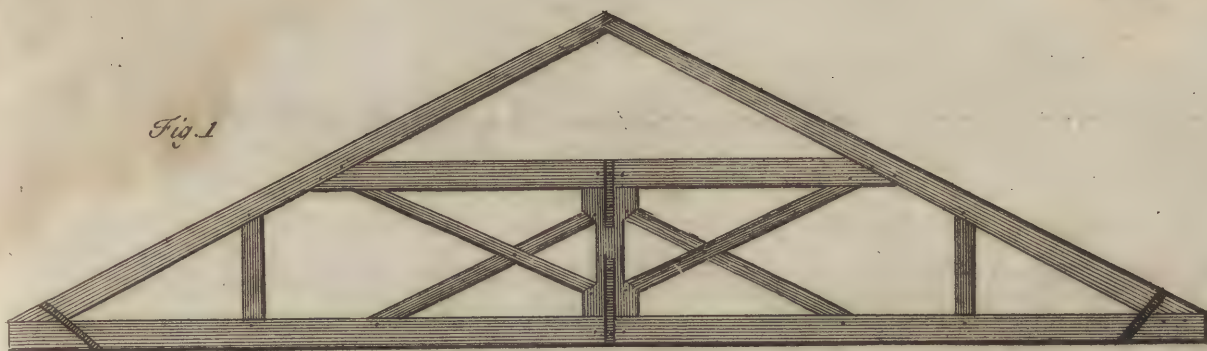


Fig. 2

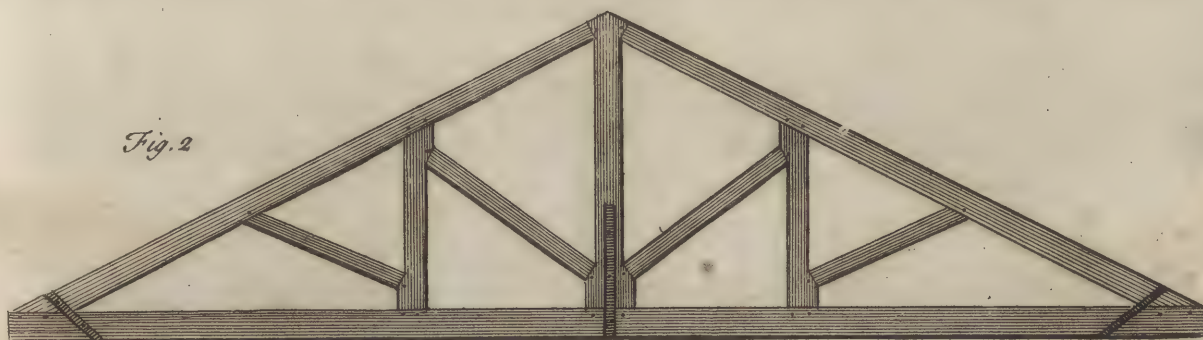


Fig. 3

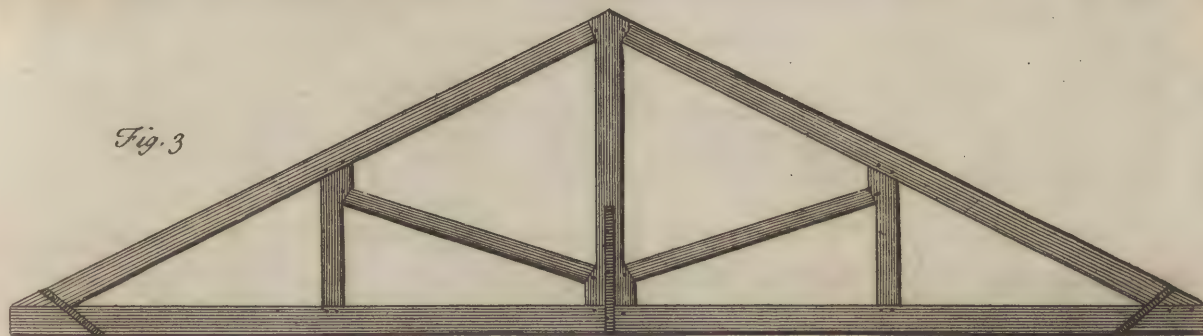
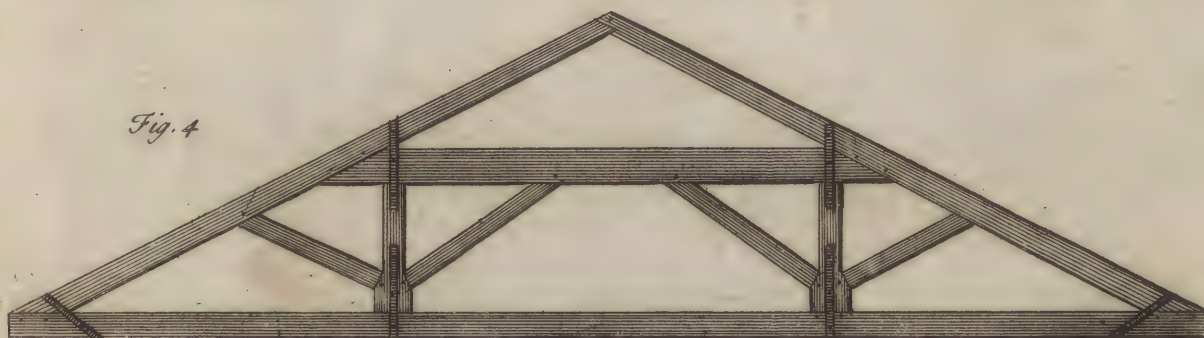


Fig. 4





*To find the Length of each Hip separate from one another ;
And first of the longest Hip.*

Draw the diagonal Line BL, and take the Height of the Gable-end EF, and place it perpendicular to BL at Q; so have you the Height of the Roof perpendicular from BL, equal to EF the Gable-end; and the Line BQ will be the Length of the Hip-Rafter, and is equal to BH; the Skirt for that Side of the Hip, as shewn by the Circles, and BR is the Side of that hipp'd End.

To find the Back of the longest Hip QB.

Lay a Ruler from the Point M to O, and mark where it cuts the diagonal Line at S; then setting one Foot of the Compasses in the Point S, extend the other Foot to the nearest Distance of the Line QB, and mark it on the Diagonal at T, and drawing the Lines OT, TM will be the Back of the Hip for that Corner of the Roof.

To find the shortest Hip QC.

The Method is all the same for this as for the longest Hip, and its Backing is also found by the same Means, and therefore sufficiently explained before, as must be easy by inspecting the Plate.

Note, This is an undoubted Rule for all Bevel Roofs, let their Pitch, or Slope, be what it will.

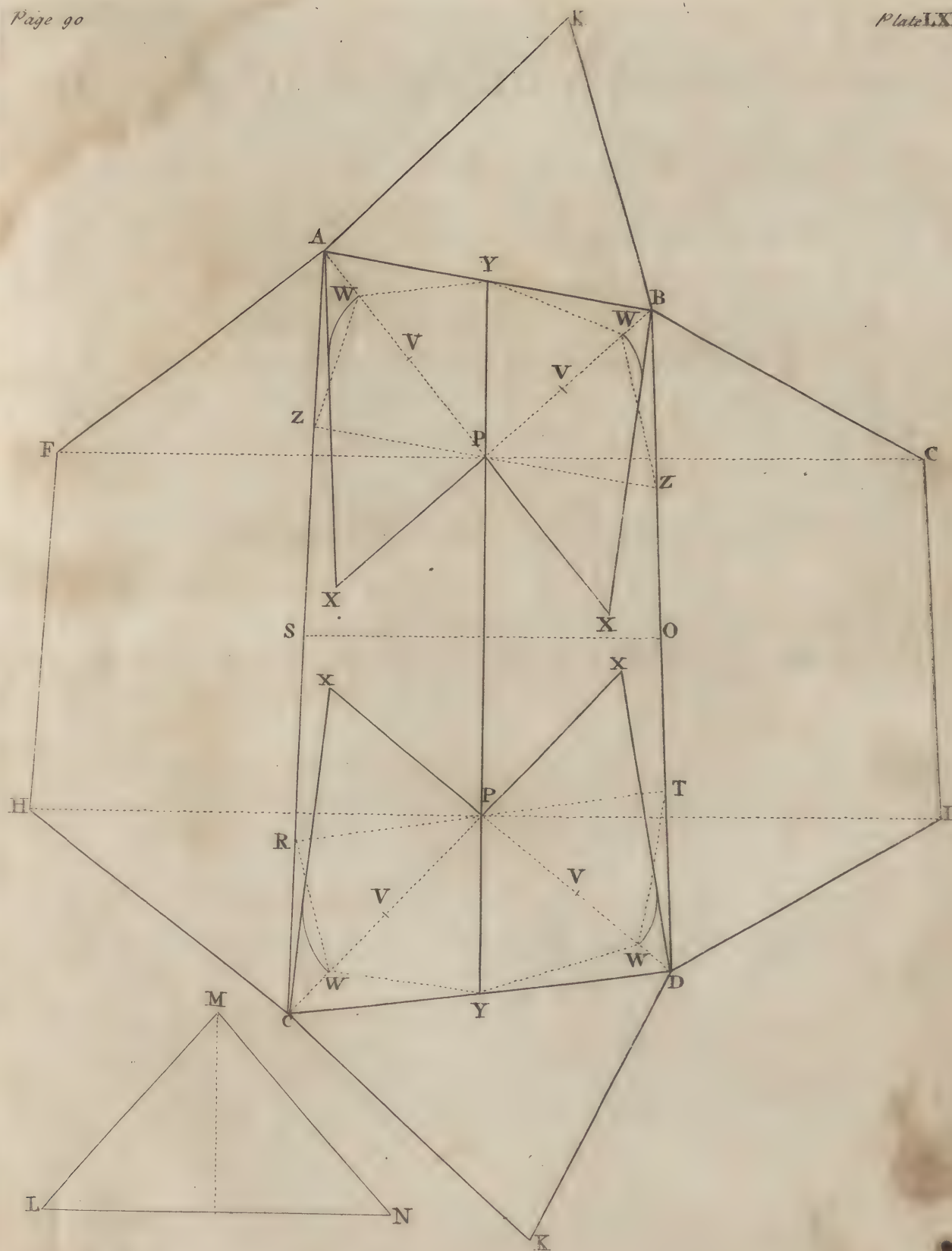
Concerning a Roof which is bevel at both Ends, and broader at one End than the other, than which none can be more difficult.
Plate LXXX.

Let A B C D represent the Plan, or Shape of the House, and LMN the Length of the Rafters, or Pitch, between the widest and narrowest End, or near the Middle of the House, so as to stand over the dotted Line SO. Observe K K are the Points of the two Hip-ends, which (when brought to their due Place) will be perpendicular to PP, and will meet the Sides F H, G I, over the said Points P and P. The Points X X X X are the Perpendiculars and Lengths of the Hips A B C D. The Points W W W W shew the Back of the Hips, or the Hip-mould, due to each Corner; and V V V V are the Points to find out the Points W W W W for each Back.

R T and Z Z are the Lines representing half the Span parallel to each End, and Y Y is the Middle, or central Line of the House.

Although the Ends of the Building be thus bevel, you may place your Beams for your principal Rafters to stand to a Square, or so near a Square as may be, or between the Extreame, as from the dotted Lines F G, H I, thus bringing the Outside of them strait under P, which will make the House handsomer within side, although it be bevel outwards.

Concerning







Concerning STAIR-CASES.

THERE is required the greatest Care and Judgment in placing of the Stairs in any Building, but commonly they are made in the Angle, Wing, or sometimes in the Middle of the Front.

To every Stair-case there is required three Openings, *viz.*

The *First*, Is the Door, or Doors, leading thereto.

Secondly, The Window, or Windows, that give Light. And, *Lastly*, The Landing, or going off to the next Story.

As to the *First*, The Doors, they should be so placed that most of the Building may be seen before you come at the Stairs, and in such a Manner that it may not be difficult to find them out.

Secondly, For the Window; if but one, it must be placed in the Middle of the Stair-case, whereby the Whole may be enlightened.

Thirdly, The Landing of Stairs should be large and spacious, for the convenient entering into the several Rooms: In short, their Stair-cases should be spacious, light, and easy to ascend, that they may thereby invite, as it were, the People to go up them.

The Height of large Steps must never be less than five Inches, nor more than seven Inches and an half. The Breadth of Steps should never be less than ten Inches, nor more than fifteen Inches.

In making of Stair-cases, the Ancients always observed this Rule, That the Number of Steps to every Stair-case should be odd, and not even, to the Intent, that when you begin to ascend with your right Foot first (as most Persons generally do) you will end with the same Foot also.

But although these are Rules laid down for the Height and Breadth of Steps, yet they are not so strictly to be adhered to, as not to vary in the least from them for it must be observed to make all the Steps of the same Stair-case of an equal Height and Breadth; to do which, must be considered the Height of the Story, as also the Space or Compass, to form the Plan of them.

Of the various Sorts of Stairs.

There are many Kinds, or Forms, of Stair-cases; in some the Steps being made strait, in others winding, in others mixed of both.

Of strait Stairs. Some fly directly forward, others are square, others triangular, others are called French Flights, or Winding-stairs (which in general are called Spiral, or Cockle-stairs) of which some are square, some circular, or round, and some elliptical, or oval; and these again are various, some winding about a solid, others about an open Newel.

Stairs mixed of strait and winding Steps, are also of several Kinds; some are called Dog-legged, some there are that wind about a solid Newel, and others that fly about a square, open Newel.

There would be no End to describe the Variety of Stairs that might be made; but the following Designs, on two Plates, it



Fig. 1.

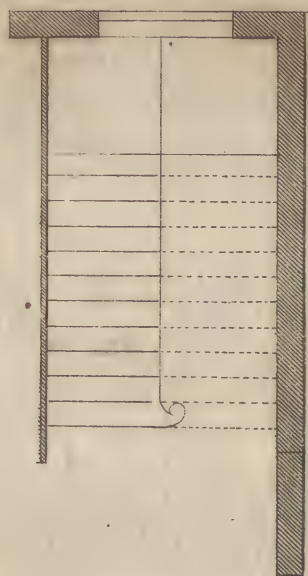
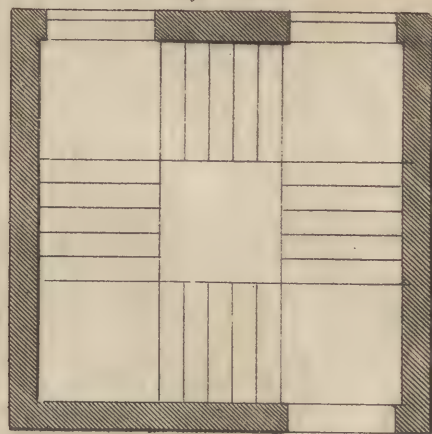
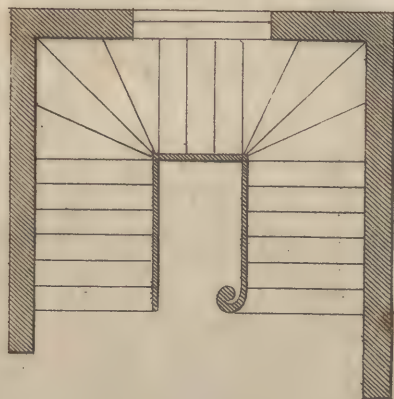


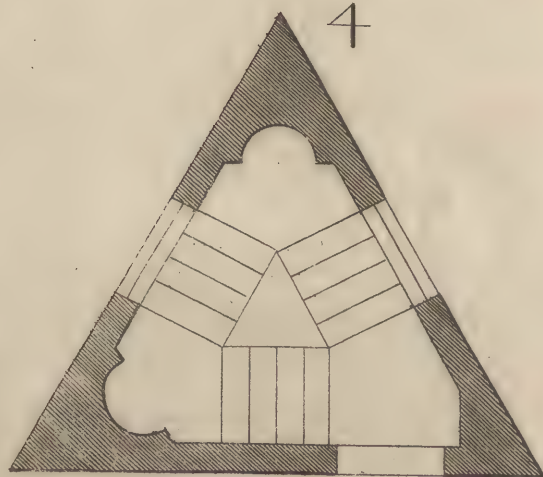
Fig. 2.



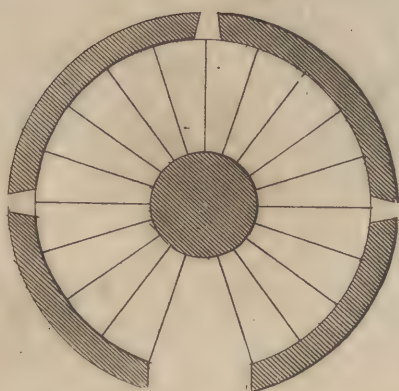
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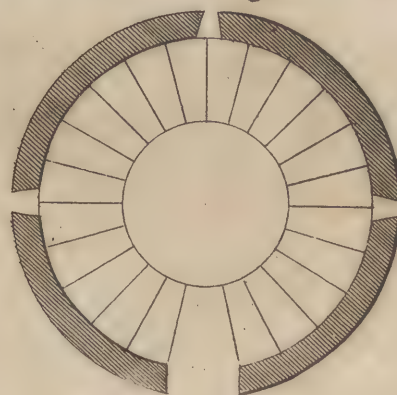
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5



6



it is hoped, will be sufficient to compose any other Sorts from that can happen.

Strait Flyers. Plate LXXXI. Fig. 1.

These kind of Stairs, first fly directly forward, till they come within the Length of a Step of the Wall, and then they have a quarter Pace; from which, without any Steps between, they ascend by a Riser to another quarter Pace; and from thence fly directly back again parallel to the first Flight.

Square Flyers. Fig. 2.

These fly round the Sides of a square Newel, either solid, or open, and at every Corner of the Newel hath a square quarter Pace.

Mixed Stairs. Fig. 3.

These are such as do both fly and wind, and therefore are by some called, in general, Flyers and Winders.

Triangular Flyers. Fig. 4.

These fly round by the Side of a triangular Newel, either solid or open; the Length-ways of the Steps are all at Right Angles, with the Side of the Newel; and in the Sharp Angles it were better to make Niches where to set Vases, Figures, &c.

Winding

Winding Stairs. Fig. 5.

These are such as are always winding and never fly. They go round a solid Newel, whose Diameter is equal to the Length of the Steps, or one-third of the whole Well-hole.

Fig. 6. These are also all Winders round an open Newel ; the Steps being in Length one-fourth, and the Opening half of the Well-hole. These Kind of Stairs are mostly used in Church Steeples, Castles, and such publick Buildings.

Other Kinds of Stairs. Plate LXXXII. Fig. 1.

These Sorts of circular Stairs are seldom or never used for Beauty, but rather because they go up in less Room, and if contrived in the Middle of the Building, they admit of being better lighted from above than other Stairs.

Fig. 2. This is a mixed Stair-case of Flyers and Winders, and hath a quarter Pace in the Middle, and may be lighted by a Bow Window in the Semicircle. Great Care should be taken in the forming this Sort of Stairs, that all the Steps, in the Middle of the Length, be of one and the same Breadth ; for by this Means, the Feet, going in the Middle, will feel no Difference, the broad Ends of the Winders next the Wall, or the narrow Ends next the Rail, being seldom in Use, except when two Persons meet, or go up, or down together.

Fig. 3. This is a circular Stair-case, in two Parts, or rather two distinct Stair-cases, which may lead off, from the Landing Places, to contrary Apartments, and is to be lighted from above.

Fig.

Fig. 1

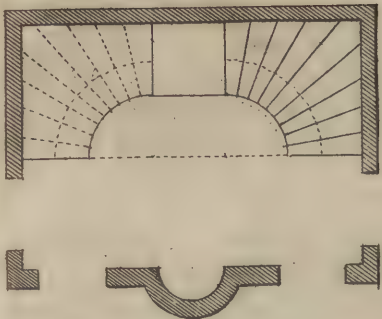


Fig. 2

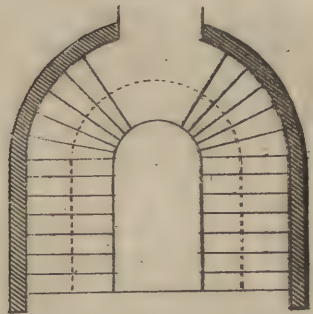


Fig. 3

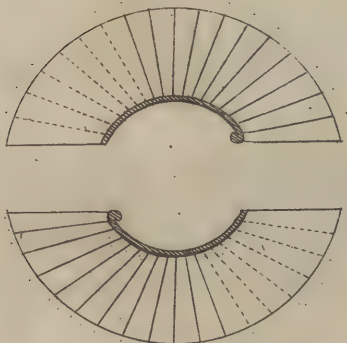


Fig. 4

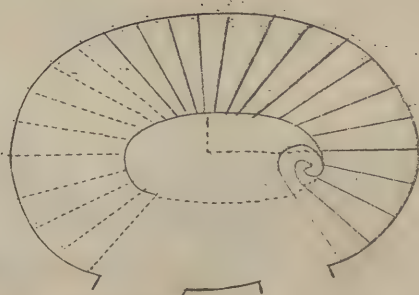


Fig. 5

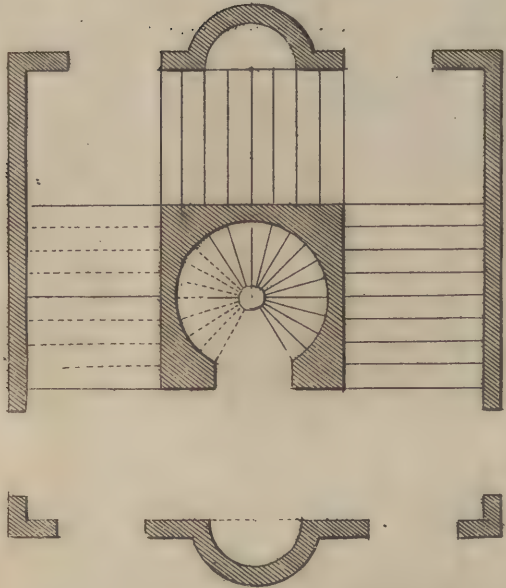
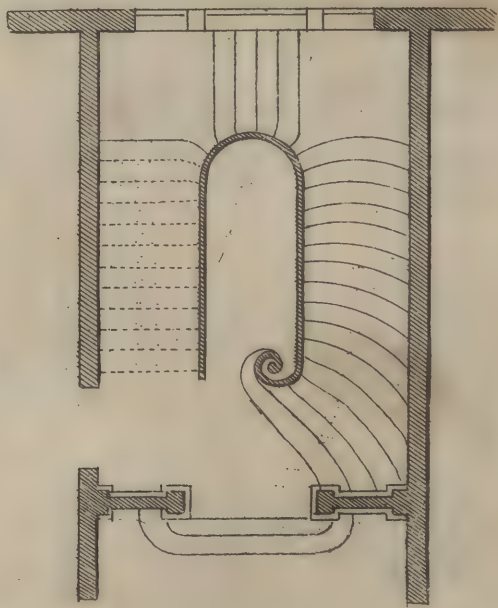
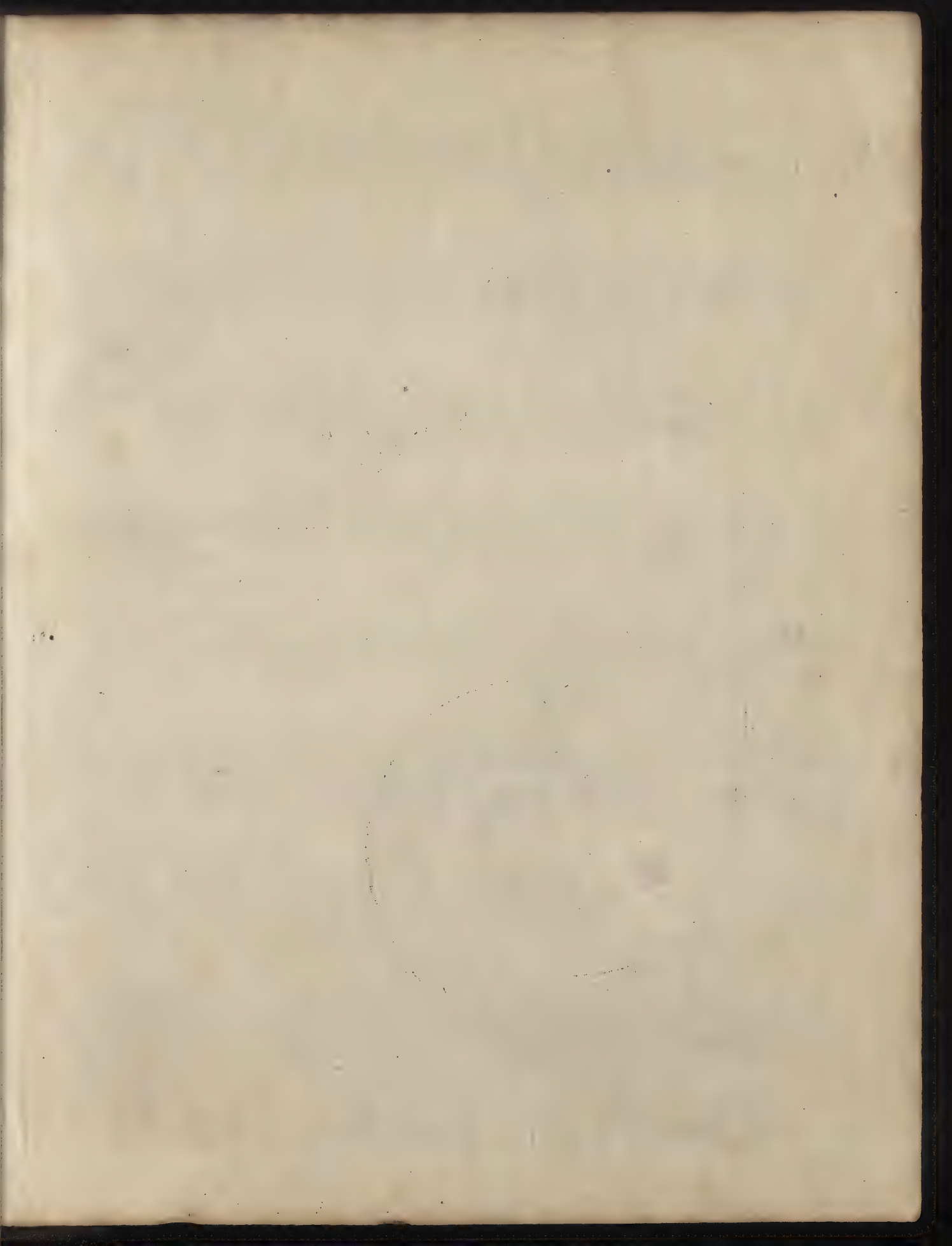


Fig. 6







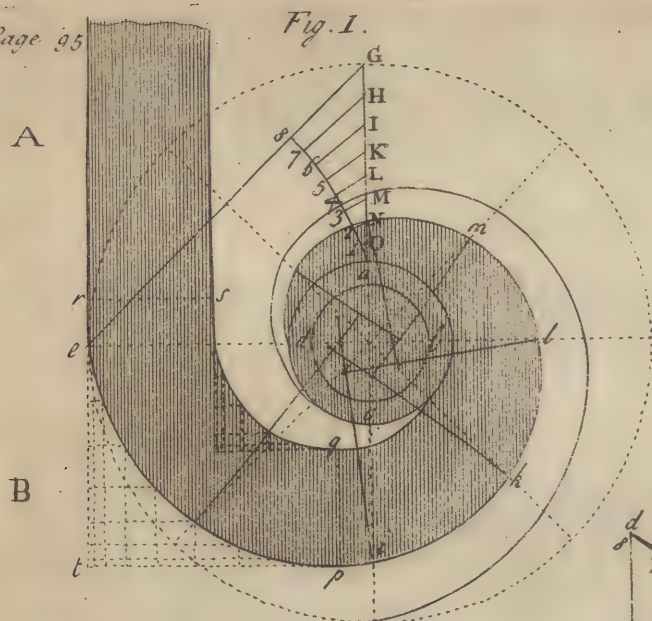


Fig. 2.



Fig. 4.

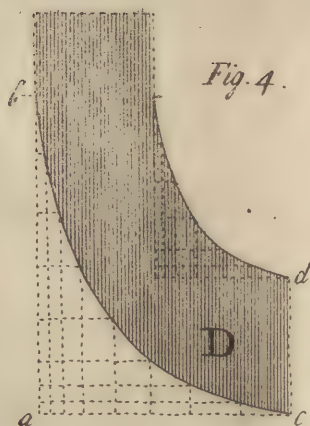


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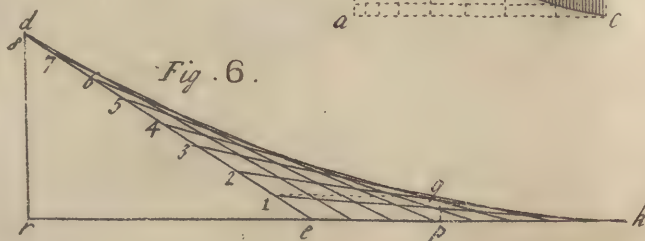


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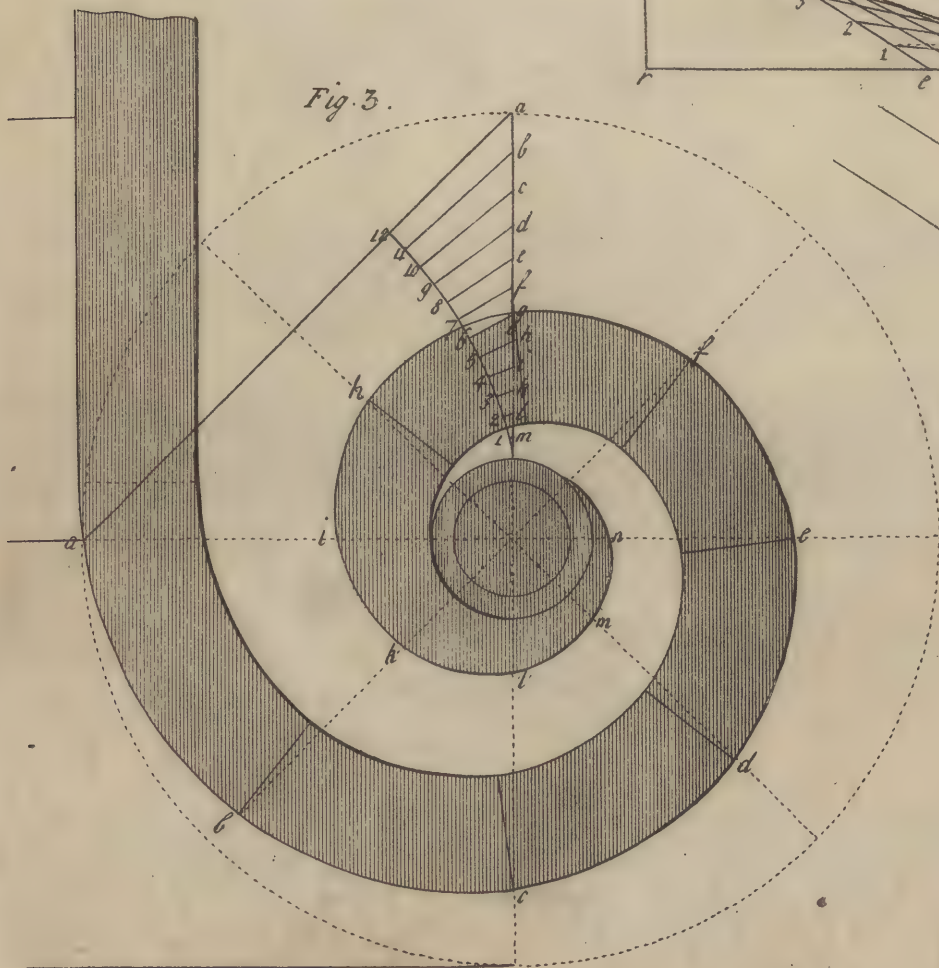


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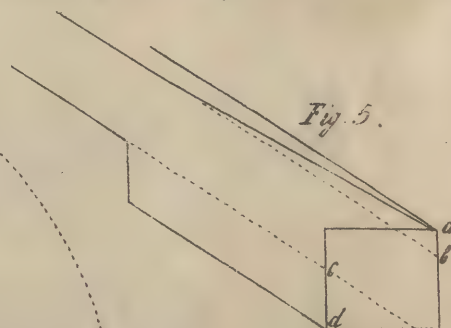


Fig. 7.

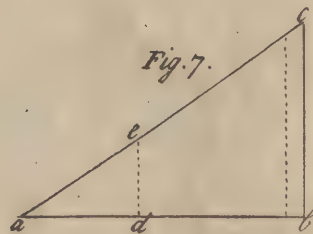


Fig. 4. Is an oval Stair-case, with a large Twist to the Rail at Bottom, and hath two Doors, or Entrances.

Fig. 5. Is a large commodious Stair-case, partly like Fig. 2. Plate LXXXI. only hath a much grander Entrance by four several Ways, and, as the Steps fly round a solid Newel, the back, or private Stairs, are made (as it were) in the Bowels thereof.

Fig. 6. The *French* Nation being very humorous in their Compositions of Stairs, and being so far different from ours, here is shewn a Specimen of their Manner, which must have an extream grand Appearance, though they are generally too much crouded up, and are very expensive. The Plan will explain it self by Inspection, therefore it were needless to dwell any longer on this Subject of the Plans of Stairs; but, whereas, in many of them, *Twisted Rails* are introduced, I shall proceed, on the next Plate, to shew the Manner of forming them.

For the Formation of the Arch, or Mould, to the Rail of every Stair-case which is to be circular, on Part of the two first Steps, so as it shall stand perpendicular over the Ground, or Plan, with the Manner of squaring the said Rail without setting it up in its Place till finished. Plate LXXXIII. Fig. 1.

When you have made your Plan, and thereby found the Breadth, or Tread of the Steps, and having also fixed on the Bigness of the intended Rail, with the Form and Projection of the Mouldings, as Fig. 2; then the Front of the second Step, between A and B must be continued out farther, and thereon describe a Circle, touching the Inside of the Rail, and whose
Diameter

Diameter must be equal to the Breadth of two Steps, which divide into eight equal Parts; then on the Center of the said Circle describe another Circle equal to the Bigness of the Rail, Fig. 2. and also another Circle to the Extremity of the Mouldings, as *a, b, c, d*.

Draw the diagonal Line *c F*, and describe the Part of a Circle *ag*; and, dividing it into eight equal Parts, continue them from the Center *e*, to the Line *FHIKLMNO a*, so will you have the diminishing Scale for the Formation of the Scroll.

Then, transferring the respective Distances *FH, FI, FK, FL, &c.* within the great Circle, on each eighth Part thereof, and taking the Distance from the main Center *C* to *F*, find the Center in the Eye, or Block, as at *f*, for the first eighth Part of the Scroll; then the Distance *CH*, for the next eighth, and so proceed to them all, and you will have the whole Scroll compleated and finished in the Block, at one Revolution of a Circle. But here it is to be observed, That the inside Scroll, though drawn from the same Centers, must not meet on the aforesaid eighth Parts of the great Circle, but a Line drawn from the outer Scroll to each Center respectively; and the whole eighth Part being marked with small Letters, the same as the diminishing Scale, it cannot need farther Explanation.

For forming the Scroll of the first Step *A*, the same Method is to be used as above; only observe, that as it begins to be circular from the second eighth Part, the Distance to the Rail must be divided into seven Parts, and gathering in one at a Time, it will be compleated.

Should it be required to make the Scroll of a larger Revolution, as Fig. 3. describe a Circle, whose Diameter is equal to three Steps, and divide the diminishing Scale into twelve Parts,
and

and by proceeding, as before, to strike one-eighth of the great Circle at a Time, you will have the Scroll, at one Revolution and a half of a Circle. But wanting it still larger, make a Circle whose Diameter is equal to the Breadth of four Steps, and the diminishing Scale divided into sixteen Parts, the Scroll will be formed at two Revolutions of the Circle; this must needs be plain enough by barely inspecting the Letters, &c.

Plate LXXXIII.

For squaring the Rail.

A Mould must be traced out to find a Sweep, which, if applied on the Rake, will be perpendicular to the Ground of $rsfq$, as Fig. 4; but observe, there will be required some (extraordinary or) more Wood on the Top of the Rail, as at ab , Fig. 5. and also at the Bottom, as cd . To find how much it must be, take Notice where the Twist begins in the Plan, Fig. 1. as rf , and also, that at k the Twist ends; therefore the Distance from r to k is divided into a Number of equal Parts, and they must be transferred on some Line, as from r to k , Fig. 6; also take the Distance rt , and apply it to the *Pitch-Board* (which is the Tread and Rise of each Step) Fig. 7. as from a to b , and raise the Perpendicular bc ; then in Fig. 6. from r , the End of the Line, make the Triangle red , equal every Way to that of abc , Fig. 7. Finally, from e to d , and from e to k , divide into eight equal Parts, and straight Lines being drawn from each Division respectively, will form a Curve, which shews how much Wood is wanting on the Back of the Rail, as pq , which transfer from b to a , in Fig. 5. and there make the Bigness of the Rail, and it will shew the Deficiency of Wood,

as above-mentioned. As to the other Part of the Twist, from p to k , as also the Block (which is level) is cut out of a parallel Piece at once.

For tracing the Mould, Fig. 4. take from r to t , Fig. 1: and apply it to the Pitch-board, Fig. 7. from a to b , and it will give the Hypothenufe (or Rake-line) ac , which transfer to Fig. 4. from a to b ; also, in Fig. 1. take from p to q , and applying it from a to d , Fig. 7. it gives ae , which place from c to d , Fig. 4. that done, trace out the Raking Mould D, by the Interfection of Lines squared from the Divisions of the Plan rp and sq , Fig. 1. which cannot be difficult, if duly consider'd; and the said Mould, when elevated to the proper Pitch, will stand exactly perpendicular over the said Plan.

So that this Mould being applied to the Top of the Rail, and the Mould, Fig. 6. on the Inside thereof, each in his respective Place, and marking them by, and the superfluous Wood being cut away, you have two Sides of the Rail squared; and as to the other two, they are found by gauging parallel to them.

This Method of forming the Raking Mould, will serve for all Twist Rails whatsoever, with due Application; but lest this Rule should appear dark and difficult, in the next Plate you have three other Methods of squaring the Twist Rail something easier than the above, but have not that Sweetness of Turn as this Rule gives them.



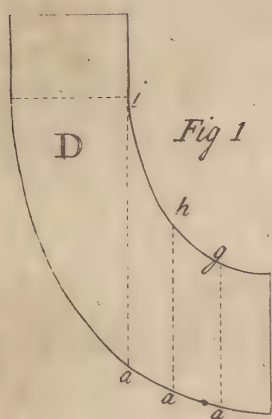


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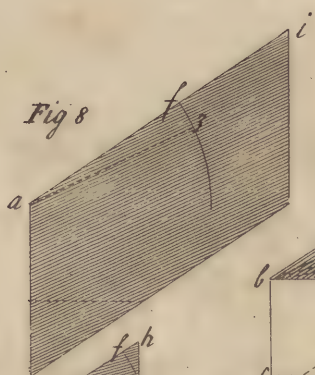


Fig 8

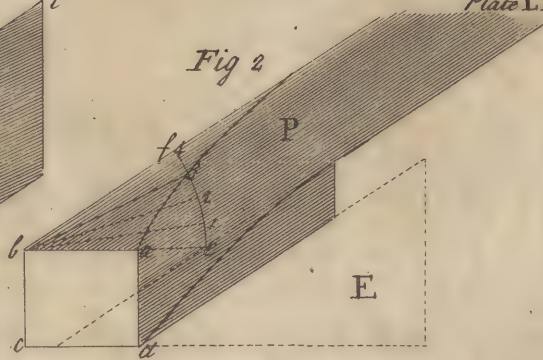


Fig 2

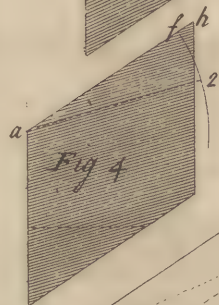


Fig 4

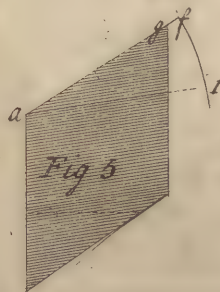


Fig 5



Fig 6

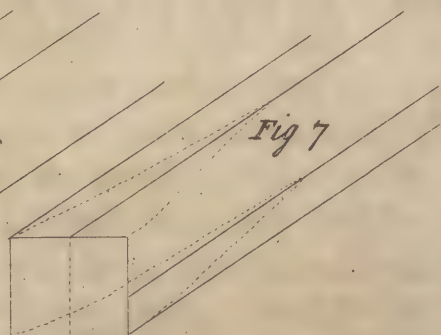


Fig 7



Fig 11

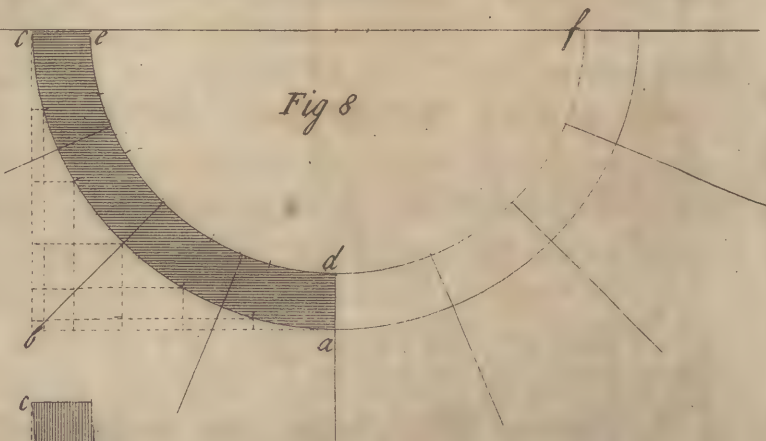


Fig 8

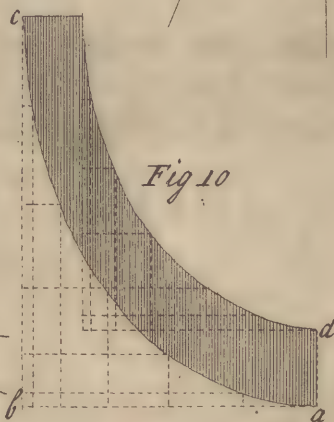


Fig 10

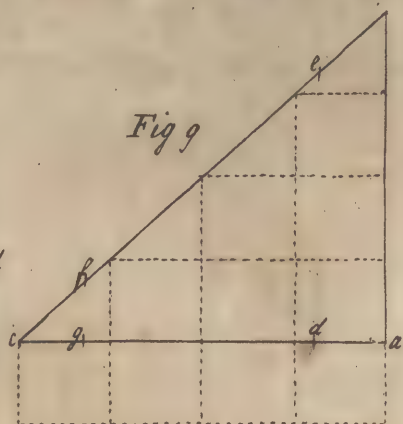


Fig 9

Plate LXXXIV.

Fig. 1. Is the Raking Mould D, taken from the last Plate, Fig. 4.

The Pitch Board E is also taken from Fig. 7. which gives the Rake or Declivity of the Rail.

Fig. 2. Shews how to square the Rail, without a Templet or Mould being bent round the twisted Part, which is by only being guided by the Back. First describe the Bigness of the Rail, as *a, b, c, d*, which will shew the Deficiency of Wood at Bottom, supposing P to be the Side of the Rail; and as it is necessary to have the Grain of the Wood answerable to the Falling of the Twist, it is to be considered, what Number of Thickness of Stuff are sufficient to cut the said Twist out of, as here three; then, in Fig. 2. continuing the Line *ab*, place one Foot of the Compasses in *b*, and describe the Section, or Part of the Circle *ef*, dividing it into four equal Parts, as 1, 2, 3, 4. The Rail P being always accounted one. Almost a bare Inspection will shew how the Grain of the Wood is to be managed, if you observe the Shapes of and Lines on the several Pieces, Fig. 3, 4, and 5, which are best if so cut by the Pitch Board, before they are glewed together.

Fig. 6. Shews how to square the Twist, making the Bottom the Guide, whose Section shews the Wood deficient on the Back.

Fig. 7. Shews how to do the same, making a Line on the Middle of the Back the Guide, the Section shewing the Deficiency of Wood on the Back and Bottom.

It was observed before, that these Rules form all Sorts of Twisted Rails, but desirous to make the Whole easy, here is shewn another Example of a Rail round the Stairs of a circular Well-hole, as Fig. 6. Plate LXXXI. Therefore here,

Fig. 8. Is the one-half of the said Plan, containing eight, which is sixteen Steps in the whole Circuit; this Plan being laid down, take half thereof, or the Breadth of four Steps, to find the Raking Mould of the Rail to it, being a small Scale, otherwise, in the *Real Practice*, the Breadth of one or two Steps is sufficient.

The Bigness of the Rail being laid down, divide the Inside of it (through the outward Circle) into a Number of equal Parts, as here into six, so as to transfer them on some Line, as $a c$, Fig. 9. and setting up the Rise of four Steps, gives the Pitch Board due to them all. Then taking $b c$, Fig. 8. applied to the Pitch Board, Fig. 9. from c to d , it gives $c e$, which transfer to Fig. 10. from b to c ; also from Fig. 8. take $a d$, placed in Fig. 9. from c to g , gives $c f$, which transfer to Fig. 10. from a to d , and there tracing, as before taught, you will have the Raking Mould required.

Several able Workmen use another Method of forming these Kinds of Rails, *viz.*

First, they make a Cylinder equal to the Well-hole, or Opening, $f e$, in Fig. 8. or part thereof, if large as this is, by fastening Boards together upright in the exact circular Line of the Plan.

Then they proceed to set, or draw, on the said Cylinder, as Fig. 11. the Height and Breadth of each Step, as $a, b, c, d, e, f, \&c.$ and to the extream Points $b, d, f, \&c.$ they bend round several thin Pieces of the Wood the Rail is to be of; the

the Breadth of them being the Height of the Rail shewn in Plate LXXXIII. Fig. 2. and so many of them as will make the Thickness; these being glewed, or otherwise fastened together, one by one, when taking off from the Cylinder, will be the Rail R, and exactly squared to the right Twist.

This Method may, by some, be despised, but it is a very safe and sure one.

Note, Either this Way, or the foregoing, is undeniable, should the Well-hole be an Ellipsis, or any other Figure for its Plan.

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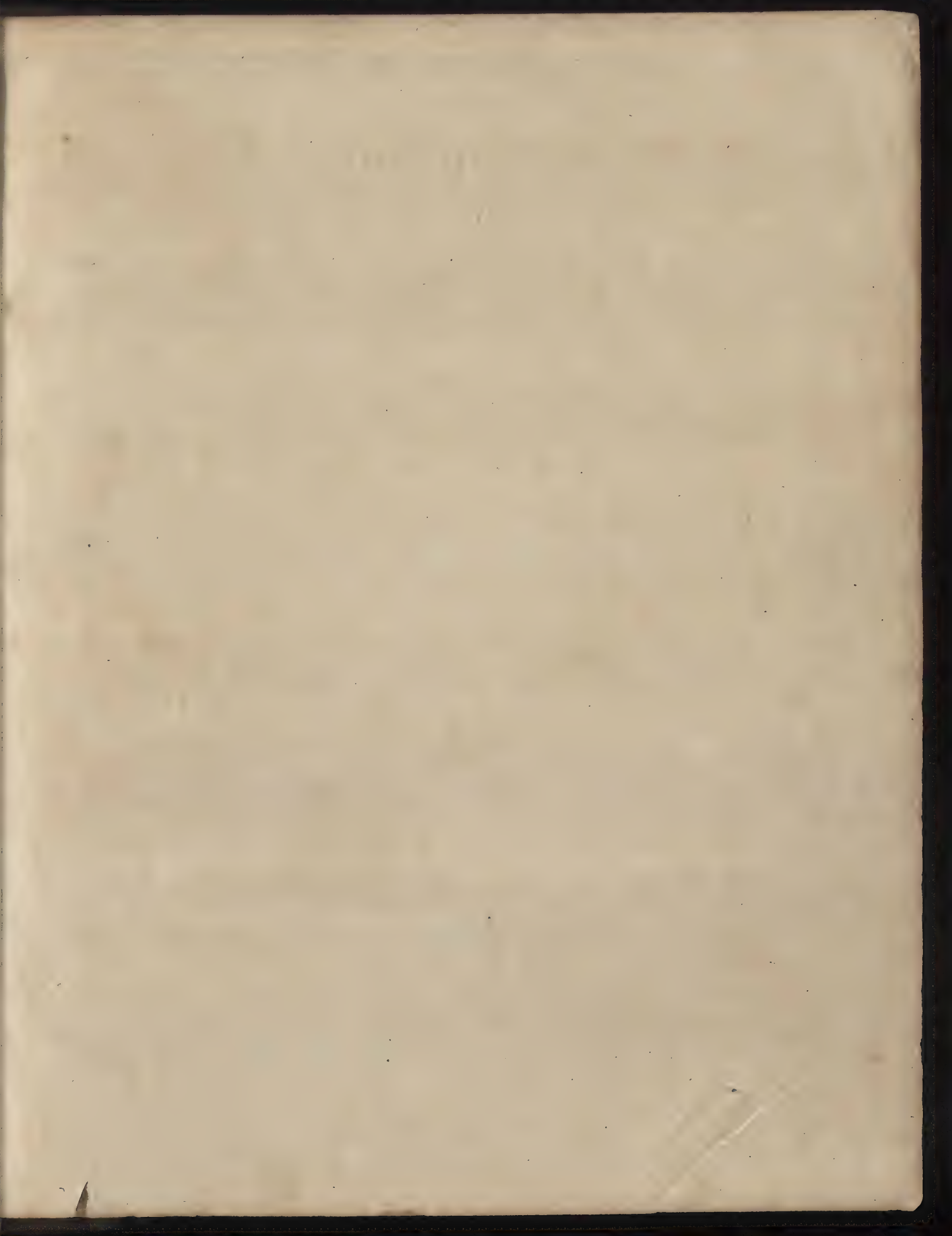
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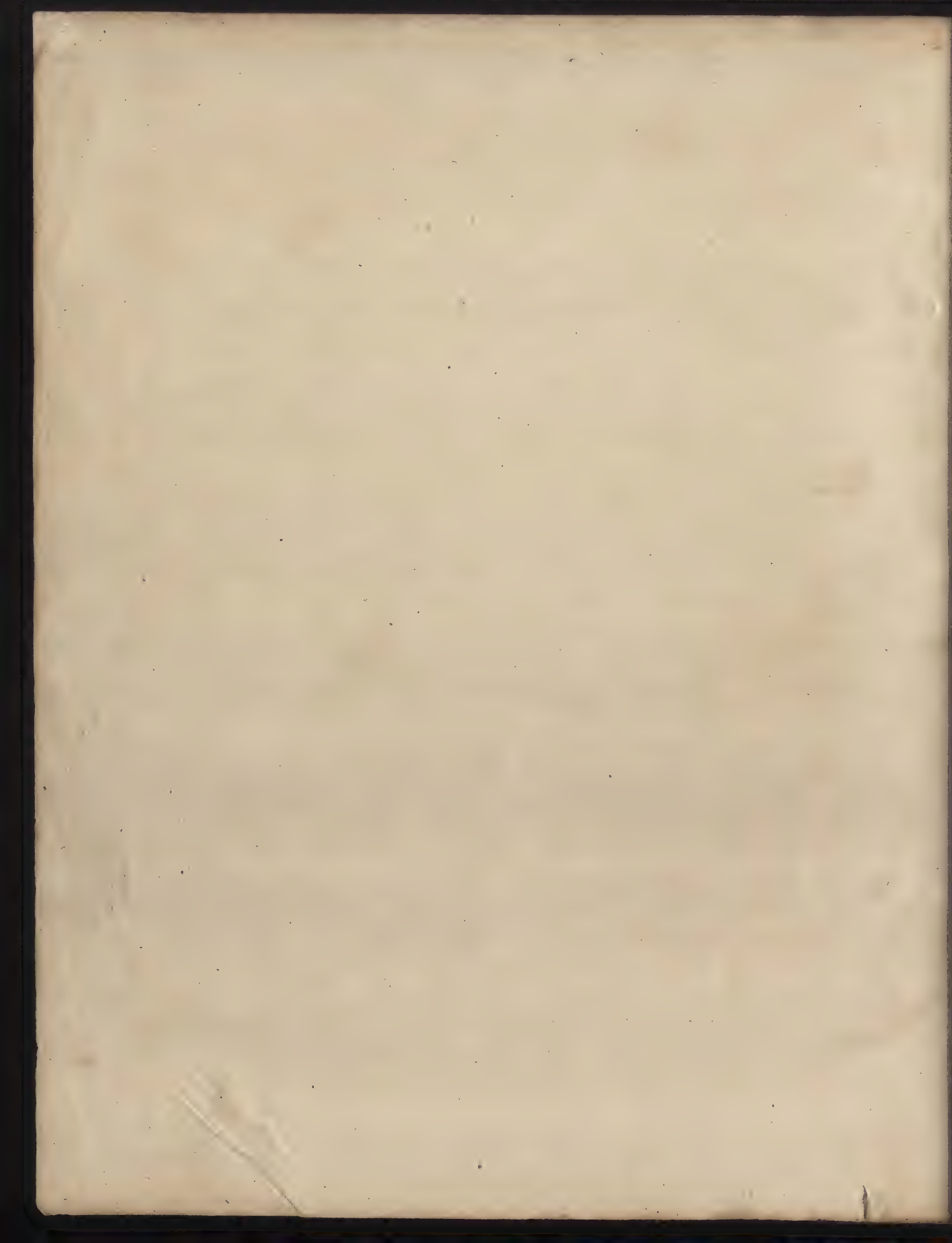
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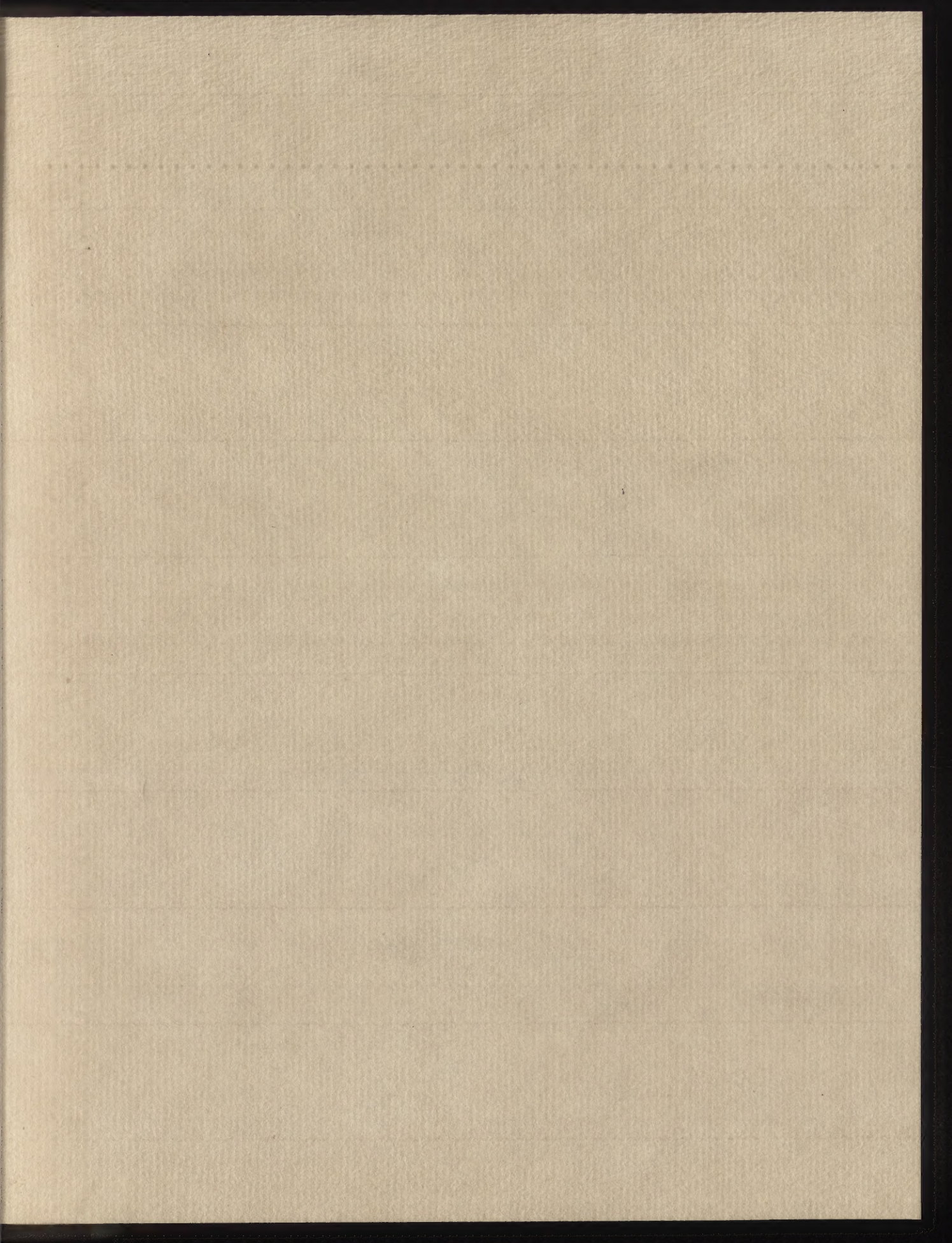
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